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COMPUTATION OF PARTIAL VAPOR PRESSURES OF AQUEOUS VOLATILE ORGANIC COMPOUND SOLUTIONS

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A program is described for the evaluation of the partial vapor pressures of solution components dependent on the concentration in solution, total pressure, and temperature. The object of the program is to provide reliable values that represent the best estimate based on the large body of experimental data available in the literature. The basis of the estimate is the evaluation of the Wilson coefficients for calculating the activity coefficients of the components using an iterative least squares algorithm to minimize the excess Gibbs free energy of solution. The computational programs are applied to binary aqueous solutions of volatile organic compounds: methanol, ethanol, iso-propanol, acetone, and methyl ethyl ketone. The statistical evaluation of the results show that where the data base is large, in excess of 20 literature citations, the estimated error is around 1%. Smaller data bases, as in the case of methyl ethyl ketone with five citations, show poorer precision (e.g., around 3%). The results are applied to the evaluation of the vapor concentration dependence of the absorbance of selected peaks in the infrared spectrum of the compounds evaluated.

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PREFACE

The work described in this report was authorized under Project No. 56553J8D13 and Contract Nos. DAAD05-93-W-0997 and DAAD05-95-P-2296. This work was started in July 1993 and completed in December 1995.

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COMPUTATION OF PARTIAL VAPOR PRESSURES
OF AQUEOUS VOLATILE ORGANIC COMPOUND SOLUTIONS

1. INTRODUCTION

The determination of the partial vapor pressures of solution components dependent on the concentration in solution, total pressure, and temperature is experimentally difficult and leads to the publication of considerable variation in results. The need is clear for reliable values that represent the best estimate of partial pressures under whatever specified conditions are determined by the user. It is not advisable to undertake an additional experimental determination to obtain the desired data and ignore the extensive body of data already accumulated in the published literature. Given the difficulties of the determination, it is unlikely that the newly acquired data would be any more reliable than the previously determined results. It would seem to be a more practical approach to attempt to reduce the available data into a relatively simple statistical representation. Two such compilations have been undertaken in the recent past by Hirata et al [1] in 1975 and Gmehling et al [2] in 1977, 1981, and 1988. Both compilations undertook to survey the literature for a wide range of compounds and reduce the individual data references in several different representations. In the more recent compilations of Gmehling (1981 and 1988) an attempt was made to further recommend composite data representations based on selected references for a compound.

The present work is a further elaboration on the computations of these compilations. The specific interest was in the partial vapor pressures of aqueous solutions of some volatile organic compounds (VOC), specifically the simple alcohols and ketones: methanol, ethanol, iso-propanol, acetone, and methyl ethyl ketone (2-butanone). These are required for the Beer's Law determination of VOC vapor concentration dependence on their infrared absorbance . Relying entirely on the literature references cited above and cross correlated in Appendix A, it has been shown by the present authors [3] that a better overall average fit of the vapor mole fraction and (by direct proportion) partial vapor pressure is obtained using the Wilson coefficient pair, W_{12} and W_{21}, obtained by minimization of the excess Gibbs free energy of mixing as described by Hirata et al but using the data references recommended by Gmehling et al. The latter describe and used two internal consistency tests based on the Gibbs-Duhem relation. Neither Hirata et al or Gmehling et al in their original publications compute a single pair of Wilson coefficients to represent a given aqueous VOC system. In their 1981 supplement, Part 1a, only those references which met both tests were used by Gmehling et al to evaluate the composite pair of Wilson coefficients for a given system. In their 1988 supplement, Part 1b, they provide temperature dependent Wilson coefficient equations. Because of difficulties in computing the temperature values of the Wilson coefficients recommended by Gmehling et al, we have elected to compute only the temperature independent values consistent with their earlier practice. As both compilations used the average deviation in the vapor mole fraction, a.d.(Y_1), as a measure of goodness of fit, the present work keeps that figure of merit but also computes the estimate of the standard error as well.

To compute the vapor pressures it is necessary to have the temperature dependent vapor pressure of the pure components (i.e., all five VOCs and water). These are obtained from both compilations as three coefficients for use in the Antoine equation. Hirata et al employ two different sets for all but one of the components. Gmehling et al use only one set for each component with only three exceptions noted in Appendix A. Because this work recalculated all of Hirata's values to verify our computer program and because it is not clear in most instances why one choice of coefficients was selected in preference to the other, we recalculated all their data sets using all four combinations (i.e., one from each pair for both components). Only the one giving the best fit for each data set was used for comparison in this evaluation. All other

computations used the Antoine coefficients given by Gmehling et al. A comparison of the three sets is also included in this discussion.

2.   COMPUTATION PROGRAMS AND RESULTS

There are six programs and ten data files presented in the appendixes. These are divided into Appendixes A - F, and correspond to taking the literature data sets for partial vapor pressure as a function of solution mole fraction and determining [1] the individual Wilson coefficients for each set in the file, [2] the "best" Wilson coefficient pair for the VOC system, and [3] the Beer's Law slope of vapor pressure as a function of absorbance for selected bands in the infrared spectrum. The programs are written in BASIC and in several instances are designed to be merged (i.e., saved as ASCII formatted files), with the appropriate data files. The version of BASIC is GW-BASIC 3.23 (1988) and is upwardly compatible with QBASIC for IBM PC compatible computers. These are interpreter (as distinguished from compiled) languages, however the programs should be able to be compiled in QBASIC and QUICK BASIC versions. It should be noted, however, that we have found that in interpreter mode GW-BASIC runs about four times faster than QBASIC. Of course, all of the programs can readily be translated into other high level languages such as the C language if so desired.

2.1   Data Literature Citations and VOCH2O.EXT Files: APPENDIX A.

As noted in the Introduction, the cross reference of literature data citations from Hirata et al and Gmehling et al has been compiled for inclusion in this appendix. In addition, there are two sets of five data files corresponding to each of the VOCs. File names are indicated in non-executable REM statements (indicated by a single quote mark) in the first line of the file listing. The filename extension indicates the compilation source: .HIR for Hirata et al and .DEC for Gmehling et al. The first three entries give [1] a formula string for the VOC, [2] the formula string for water, and [3] the number of data sets. Subsequent consecutively numbered lines hold successive sets. Each data set starts on a new line with four (4) values identifying [1] set identifier string indicating the publication and page number, [2] value=1 for isobar or value=2 for isotherm, [3] total presssure in torr for isobar or constant temperature in Celcius for isotherm, and [4] number of points in the set. The data for each point follows as X(i),Y(i), t(i) or p(i) (isobar or isotherm respectively) where X(i) is the liquid mole fraction of the VOC and Y(i) is its vapor mole fraction. The final lines each consist of a formula string for the component followed by the three Antoine coefficients (in the order: A, B, C) used in computation. In the HIR files having two sets of Antoine coefficients for each component, the one of the pair not to be used must be disabled as a REM statement by insertion of the single quote mark before the DATA statement. The formula strings have been suffixed with either "-1" or "-2" to indicate which of the pair were active.

2.2   Program LIQVAPLP.BAS: APPENDIX B.

This program is constructed to be merged with a VOC data file and performs an iterative linear least squares determination of the Wilson coefficients for each data set in the file. A screen plot of the fitted curve of X(i) vs. Y(i) with the experimental and computed data plotted to illustrate the fit and the computed values of the partial vapor pressure and temperature for each point are displayed on the video. The diagonal line represents ideal solution behavior. A summary of the data set, the Antoine coefficients used, and the computed results with associated statistical quantities are sucessively output to the lineprinter. In addition to the program listing, a sample screen display and the printer output for the MEOHH2O.DEC file is included in this appendix. Although the computation proceeds without any programmed pauses or breaks, it can be paused from the computer keyboard using the Pause key. During a pause, screen printing via the Print Screen key may be executed but requires interrupting the line printer output by form feeding prior to the screen print. In the sample screen print, the program was paused as the tenth deviation was listed and prior to plotting the corresponding computed point

(light gray circles). By way of example, the experimental point as listed in the data file was 760 torr at 82.10 °C, the calculated values of 763.6 torr and 82.37 °C yield deviations of 3.6 torr and 0.26 °C.

2.3   Program LVSEARCH.BAS: APPENDIX C.

Like the preceding program, this program also must be merged with a VOC data file. By accepting as input from the keyboard a range of values for both Wilson coefficients, it is used to search for the "best" pair of Wilson coefficients by computing the average deviations in the VOC vapor mole fraction and corresponding temperature as well as the estimate of the standard error in the VOC vapor mole fraction for each data set in the file. These values are output to the lineprinter for each pair of values of Wilson coefficients followed by the average of the three quantities for the entire file. The program was written using a "grid search" algorithm that takes the manual input of range and step size rather than an automatic search based on a simplex algorithm because it is not certain that a simple, single, minimum in the %a.d.(Y_1) exists for the sets in a given data file. Sample calcuations included in this appendix include the output obtained using the MEOHH2O.DEC file with $0.4338 <= W_{12} <= 0.4340$ in two steps and $1.0264 <= W_{21} <= 1.0266$ in two steps (i.e., three values for each coefficient for a total of nine file averages). In all systems studied, single minima were found to a precision consonant with the fourth decimal place in the Wilson coefficients. The sample calculations were selected to center on final grid search of the "best" values for this system with the criterion being a minimum in %a.d.(Y_1). The values found illustrate the typically observed behavior of a reciprocal relation between the pair of Wilson coefficients even as the minimum in the %a.d. is changing in the fourth and fifth decimal places as noted in the following array:

%a.d.(Y1)		W(12)		
		0.4338	0.4339	0.4340
	1.0264	0.61026	0.61022	0.61021
W(21)	1.0265	0.61025	0.61018	0.61026
	1.0266	0.61022	0.61023	0.61034

This is elaborated on in the following paragraph. For each VOC, the first grid search spanned the range of the computed values of both Wilson coefficients, with each subsequent search the range was narrowed and the step size decreased until a resolution of 0.0001 was reached.

2.4   Program WILSONMW.BAS & ANTOINE3.BAS: APPENDIX D.

This program is specifically adapted to the results of the methanol water system and incorporates the results the LIQVAPLP.BAS program. It compares the dependence of the Wilson coeffficients on the selection of Antoine coefficients. These results are incorporated into the program as three groups of DATA statements. The first line of each group (following a REM statement identifying the group) contains the system identifier string and the number of data sets in the file group. Each subsequent line contains seven data on each data set in the group file followed by a REM statement listing the set reference and number of points in the set. Of the seven data only the first two, the least squares calculated Wilson coefficients, and the last, the figure of merit are used by this program. The remaining four are the maximum and miminum values of the pressure and temperature, respectively, associated with the experimental data. In the case of isobaric data, the two pressures are identical and for the isothermal data the temperatures have the same value. The output of this program consists of screen plots of the Wilson coefficients, W(12) versus W(21), all to the same scale with error circles proportional to their associated figures of merit. The three groups represent the results for [1] the HIR file using the Antoine coefficients used in their compilation, thus reproducing their original results, [2] the HIR file using the particular set of Antoine coefficients (i.e., one of two for the methanol and water each) that was found to give the smallest sum of squared residuals, SQ, and [3] the DEC file using the Antoine coefficients recommended by Gmehling, et al. The figures of merit for the

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HIR groups were SQ, those for the DEC file were %a.d.(Y1). Screen plots for all three groups are included in the appendix. Also included on each plot are the computed mean values of the Wilson coefficients, both listed on the graph and plotted as cross hairs. Although, the DEC and HIR errors are not directly comparable, the contrast between the DEC and HIR spread is a clear indication of the effect of the Gibbs-Duhem criteria applied to the literature data by Gmehling et al for the DEC file. It is interesting to note that between the two HIR plots, the mean of the better Antoine selection shows a significant shift towards the DEC mean.

The second program is a small routine to calculate the vapor pressures of the pure components as a function of temperature based on the particular set of Antoine coefficients. These are noted in their identifying formula string with a "-1" or "-2" suffix for the sets used by Hirata et al and without any suffix for the values used by Gmehling et al. This is of interest because the iterative least squares computation of the Wilson coefficients is unpredictably sensitive to the computed pure vapor pressures and in occasional cases does not converge. These have been indicated in the Cross Reference in Appendix A by noting the file number in parentheses. Sample listings for methanol and water are included here. It should be noted that Gmehling's values almost consistently fall between those of Hirata's two values over the temperature range and thus would seem to be a better compromise choice.

2.5   Program VPVOCH2O.BAS: APPENDIX E.

Having established a pair of Wilson coefficients and appropriate values for the Antoine coefficients for the two component system, the need remains for a program to calculate the partial vapor pressures of the solution components at a specific temperature and concentration. This program stores all three sets of Antoine coefficients for all six components plus the Wilson coefficients obtained by one of four different methods. Only one set of Antoine coefficients are enabled, the other sets are disabled by the single quotation mark REM in the list of DATA statements in the program. The four sets of Wilson coefficients include [1] DEC Best - the best grid search fit of the DEC files, [2] DEC Mean - the mean values of the least square fit of the DEC files, [3] DEC GOa - the pair recommended by Gmehling et al in the supplement Part 1a (1981) based on the minimization of the sum of residuals of the activity coefficients as opposed to that of the excess free energy (i.e., $\gamma(i)$ instead of $x(i) \ln \gamma(i)$) using the same file and Antoine coefficients as (1) and (2), and [4] the pair obtained from the best fit of the HIR file recalculated for the best Antoine set. After selection of one of the Wilson pairs has been entered, the program requires input for the temperature of the calculation, which VOC, and the mole fraction of the VOC. The program prints the vapor pressure and weight fractions of the VOC and water, then loops for other mole fractions until 100% is entered. A sample screen print is included of an initial run of the program. With the vapor pressure data obtained from this program for four of the VOCs at seven concentrations and four concentrations for 2-butanone, using the selected values of the Wilson coefficients, the necessary data is in hand to examine the absorbance results of the infrared spectra.

2.6   Program BEERLAW3.BAS: APPENDIX F.

This program is a standard linear least squares analysis of the slope and intercept and the associated estimates of the standard errors to evaluate the Beer's law dependence of the absorbance at selected infrared peaks of the VOCs. The analysis of the absorbance data for the various solutions that had been prepared for the spectroscopic studies has been described elsewhere.[4] The spectra were obtained with a specially designed vapor cell using a laboratory FTIR spectrometer. Three sample spectra were recorded for each solution. The transformed spectra were evaluated using boxcar apodization (i.e., no apodization function) at a resolution of 2 cm^{-1}. The peak absorbances were stored as three sets of absorbance and vapor pressure pairs for the seven (or four 2-butanone) concentrations at each of the peak wavelengths for a total of 21 (or 12 2-butanone) points to be evaluated by least squares at each of the peak maxima studied. Each set is identified by two string values indicating [1] VOC formula and

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apodization function, and [2] peak wave number and resolution. These are listed following the numerical data. The output of the results is in the form of a screen plot with the computed results listed and the vapor pressure, experimental absorbance and calculated absorbance tabulated. The vapor pressure column indicates which of three vapor pressure calculations is being fitted: DEC Best, GOa Publ.(DEC), or HIR Best. This latter choice being made at the beginning of the program run. The acutal vapor pressures for the two DEC calculations are stored in a separate data statement which immediately precedes all the data statements for a given VOC. This statement consists of [1] the number of peaks, [2] the number of absorbances per peak, followed by the computed DEC Best vapor pressures then the computed GOa Publ. vapor pressures. The HIR vapor pressure are stored with the absorbance data in the subsequent data statements as three sets of seven (or four 2-butanone) data pairs.

3. CONCLUSIONS

The series of programs described in this report provide the means to obtain a consistent set of partial vapor pressures for any volatile compound at any specified temperature in the liquid range and any composition within the single liquid phase region of a solution. As discussed elsewhere,[3] the DEC Best values of the Wilson coefficients provide the smallest standard error for the vapor mole fraction. Values ranged between 0.9 and 1.4% for four of the five VOCs and 3.2% for 2-butanone. The larger error for 2-butanone mostly likely is a consequence of both the smaller data base and the limited solution range prior to two phase formation around 5.5 mole %. It is also noted that as the number of data sets in the file gets sufficiently large the DEC Mean and DEC Best standard errors converge with a lower limit around 20 sets per file. Fewer sets per file (e.g., between 10 and 15) still yield acceptable errors but with grid search clearly superior to the average value. For even fewer sets, as in the case of 2-butanone where only five sets are available, errors are not nearly as good. We have also observed that evaluating only those sets that satisfy the double consistency tests employed by Gmehling et al provides a tighter grouping of the Wilson coefficients. The HIR Best fit gave errors at least 100% greater than the DEC Best values. Those values given by Gmehling in Part 1a gave errors about 50% greater than the Best values, this clearly a consequence of the choice of the minimizing function as noted in section 2.5.

Using the format for data statements described, additional solutes can be evaluated using these programs. Within the limitations noted, the quality of the results obtained should be limited only by the availabilty of an adequate base of experimental data. Finally, it should also be noted that there is no restriction to solvent. Water was employed in this study only because of the convenience and availability of data.

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4. P. E. Field, R. J. Combs, and R. B. Knapp, "An Equilibrium-Vapor Cell for Quantitative Infrared Absorbance Measurements," ERDEC-TR-273, U. S. Army Edgewood Research, Development, and Engineering Center, Aberdeen Proving Ground, MD, August 1995, UNCLASSIFIED REPORT. (AD A299833)

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SYSTEM First author,Lit.cit.	COMPILATION:HIRATA ISObar/therm	File #	GMEHLING Vol.,p.*	
ACETONE-WATER				
Othmer,Ind.Eng.Chem.,37,299(1945)	200 torr	H 492	G 238	-+
"	350 torr	H 493	G 239	-+
"	500 torr	H 494	G 240	ab
Chu,Dist.Equil.Data,Reinhold,NY(1950)	760 torr		G 235	ab
Eduljee,Ind.Eng.Chem.,3,44(1958)	760 torr		G 236	ab
Kochima,Kogaku,32,149(1968)	760 torr	H 495	G 237	ab
Brunjes,Ind.Eng.Chem.,35,255(1943)	760 torr		G 234	ab
Reinders,Chim.Phys.-Bas.,66,579(1947)	760 torr	H 496	G 244	--
Othmer,Ind.Eng.Chem.,44,1872(1952)	760 torr	H 497	G 242	ab
Kato,J.Chem.Eng.Japan,4,311(1971)	760 torr		Gb 141	b
Verhoeye,J.Appl.Chem.Biot.,23,607(1973)	760 torr		G 250	ab
Othmer,op.cit.(1952)	2585 torr	(H 498)		
"	5172 torr	(H 499)		
"	10344 torr	(H 500)		
"	12928 torr	(H 501)		
"	25855 torr	(H 502)		
Beare,J.Phys.Chem.,34,13100(1934)	25.0 C	H 503		
Liberwirth,Z.Phys.Chem.,260,669(1979)	35.0 C		Ga 195	ab
Taylor,J.Phys.Chem.,4,290(1900)	60.0 C		G 248	ab
Griswold,Ch.E.Prog.Symp.3,48,18(1952)	100.0 C		Ga 194	ab
"	150.0 C	H 504		
2-BUTANONE-WATER				
Othmer,Ind.Eng.Chem.,37,299(1945)	200 torr		G 360	a
"	350 torr	H 505	G 361	-+
"	500 torr	H 506	G 362	a
"	760 torr	H 507	G 363	ab
Verhoeye,Ind.Chim.Belge,36,109(1971)	760 torr		(Ga 278)	ab
Lichak,Zh.Prikl.Khim.,49,811(1976)	760 torr		(Ga 277)	ab
Cho,Fluid Phase Equil.,11,137(1983)	760 torr		Gb 204	b
Lencka,Fluid Phase Equil.,18,245(1984)	760 torr		Gb 205	b
Othmer,op.cit.(1952)	5172 torr	H 508		
"	12928 torr	H 509		
"	25855 torr	H 510		
Marshall,J.Chem.Soc.,89,1350(1906)	73.6 C		(G 359)	a
METHANOL-WATER				
Othmer,op.cit.(1945)	200 torr		G 66	ab
"	350 torr		G 67	ab
Olevsky,Tr.Giap.,Vyp.6,45(1956)	350 torr		G 64	ab
Othmer,op.cit.(1945)	500 torr		G 68	ab
Bennet,J.Chem.Educ.,6,1544(1929)	735 torr	H 513	G 37	--
Bredig,Z.Phys.Chem.,130,1(1927)	760 torr	H 514	G 40	-+
Othmer,op.cit.(1945)	760 torr		G 69	b
Dunlop,Thesis,Brooklyn Poly.(1948)	760 torr	H 515	G 47	ab
Huges,Chem.Eng.Prog.,48,192(1952)	760 torr	H 517	G 52	ab
Novella,A.R.Soc.Espan.Fis.Quim.,48,397(1952)	760 torr		Ga 55	ab
Uchida,Kag.Kikai Chem.Eng.,17,191(1953)	760 torr		G 74	a

Green,Ind.Eng.Chem.,47,103(1955)	760 torr		G 48	ab
Olevsky,op.cit.	760 torr		G 65	ab
Swami,Trans.Ind.Inst.Chem.Eng.,9,32(1956)	760 torr		Ga 58	ab
Ocon,An.R.Soc.Espan.Fis.Quim.,54B,525(1958)	760 torr		G 58	ab
" 55B,255(1959)	760 torr		G 60	ab
Ramalho,Eng.Chem.,53,895(1961)	760 torr	H 516	G 71	ab
Kojima,Kag.Kogaku,32,149(1968)	760 torr		Ga 53	ab
Dalager,J.Chem.Eng.Data,14,298(1969)	760 torr	H 518	G 43	−
Kohoutova,Czech.Chem.Com.,35,3210(1970)	760 torr		G 53	ab
Maripuri,J.Chem.Eng.Data,17,366(1972)	760 torr		G 54	ab
Verhoeye,op.cit.	760 torr		G 76	ab
VanZandijcke,J.Appl.Chem.Biot.,24,709(1974)	760 torr		G 75	ab
Chuem,Ch.E.J.,13,1107(1967)	2280 torr	H 519	G 50	-+
G 50 & G 51:Hirata etal, Elsevier,NY,1975			Ga 50	−
"	3800 torr	H 520	G 51	-+
Ga 50 & Ga 51:Hirata&Suda,Kag.Kogaku,31,759(1967)			Ga 51	−
"	6080 torr	H 521		
"	8512 torr	H 522		
Kooner,Aust.J.Chem.,33,9(1980)	25.0 C		Gb 29	b
Bredig,op.cit.	39.8 C	H 523	G 38	−
Ratcliff,Can.J.Chem.Eng.,47,148(1969)	39.9 C		G 72	ab
Bredig,op.cit.	49.8 C	H 524	G 39	-+
Broul,Czech.Chem.Com.,34,3428(1969)	60.0 C	H 525	G 41	ab
Griswold,op.cit.	100.0 C	H 526	G 49	+-
Schroeder,Chem.Ing.Tech.,30,525(1959)	140.0 C	H 527		
Griswold,op.cit.	150.0 C	H 528		
"	200.0 C	H 529		

ETHANOL-WATER

Kirschbaum,Z.B.Verfahr.,1,10(1939)	50 torr	H 530	G 166	-+
"	100 torr	H 531	G 167	
"	"		Ga 129	a
Beebe,Ind.Eng.Chem.,34,1501(1942)	190 torr	H 532	G 151	-+
Kirschbaum,op.cit.	250 torr	H 533	G 168	a?
"	"		Ga 130	a?b
Beebe,op.cit.	380 torr	H 534	G 152	-+
Stabnikov,Izv.Vyssh.Uche.Zaved,149(1972)	380 torr		G 187	ab
Ghosh,Ind.Chem.Eng.Trans.,6,70(1964)	495 torr		Gb 86	
Kirschbaum,op.cit.	500 torr	H 535	G 169	a?
"	"		Ga 131	a?b
Macarron,Rev.Real.Acad.Cienc.,53,607(1959)	705 torr		Ga 136	ab
Rius,Chem.Eng.Sci.,10,288(1959)	706 torr	H 536	G 183	ab
Otsuki,Chem.Eng.Prog.,49,557(1953)	736(b@760)		G 177	ab?
Kirschbaum,op.cit.	740 torr	H 537	G 170	a?
"	"		Ga 132	a?b
Johnson,Can.J.Technol.,34,413(1957)	755 torr		G 162	ab
Schmidtt,Thesis Heidleberg(1979)	755 torr		Gb 111	
Carey,Ind.Eng.Chem.,24,882(1932)	760 torr	H 538	G 154	
Jones,Ind.Eng.Chem.,35,666(1943)	760 torr		G 165	ab
Rao,Metals Miner.Rev.,2,6(1948-49)	760 torr		Gb 110	b
Rieder,Ind.Eng.Chem.,41,2905(1949)	760 torr		G 181	ab
Huges,op.cit.	760 torr		Gb 91	
Bloom,Ind.Eng.Chem,53,829(1961)	760 torr	H 539	G 153	ab
Kauer,Wiss.Z.T.H.Chem.Leuna,5,329(1963)	760 torr		Gb 92	b
Kojima,op.cit.	760 torr		Ga 133	ab
Kojima,Int.Chem.Eng.,9,342(1969)	760 torr		G 171	ab

Stabnikov,op.cit.	760 torr		G 188 ab
Stabnikov,Pishch.Prom.(Kiev),15,49(1972)	760 torr		G 184 ab
Otsuki,op.cit.	2586(a@2501)	H 540	G 179 ab?
"	5172 (G@5002)	H 541	Ga 141 +-
"	10344 torr	H 542	
"	15512 torr	H 543	
Dobson,J.Am.Chem.Soc.,,2866(1925)	25.0 C		Ga 125 ab
Hall,NPL Rep.Chem.,95(1/1979)	25.0 C		Ga 126 ab
Phutela,Aust.J.Chem.,32,2353(1979)	25.0 C		Gb 108
Mertl,Czech.Chem.Com.,37,366(1972)	40.0 C		G 172 ab
Jones,op.cit.	50.0 C	H 544	G 163 --
Dulitskaya,Zh.Obs.Khim.,15,9(1945)	50.0 C	H 545	G 161 -+
Choudhury,Ind.J.Chem.,14A,553(1976)	50.0 C		Ga 118 ab
Mertl,op.cit.	55.0 C		G 173 ab
Jones,op.cit.	60.0 C	H 546	G 164 --
Rao,Trans.Ind.Inst.Chem.Eng.,2,6(1948-49)	65.0 C		*Ga 147 -+ a
Mertl,op.cit.	70.0 C		G 174 ab
Rao,op.cit	70.0 C		*Ga 148 -+ a
Nikolkaya,Zh.Fiz.Khim.,20,421(1946)	75.0 C		Gb 107
Rao,op.cit.	75.0 C		Ga 149 ab
"	80.0 C		*Ga 150 -- a
Griswold,Ind.Eng.Chem.,35,701(1943)	150.0 C	H 547	
Barr,J.Chem.Eng.Data,4,107(1959)	150.0 C	H 548	
Griswold,op.cit.	200.0 C	H 549	
Barr,op.cit.	200.0 C	H 550	
"	250.0 C	H 551	

2-PROPANOL-WATER

Davalloo,Iran.J.Sci.Technol.,1,279(1972)	95 torr		Ga 241 ab
Wilson,Ind.Eng.Chem.,41,2214(1952)	95 torr	H 557	G 331 ab
"	190 torr	H 558	G 332 ab
Davalloo,op.cit.	192 torr		Ga 242 ab
Wilson,op.cit.	380 torr	H 559	G 333 ab
Davalloo,op.cit.	381 torr		Gb 173
"	758 torr		Ga 243 ab
Lebo,J.Am.Chem.Soc.,43,1005(1921)	760 torr	H 560	G 318 -+
Brunjes,Ind.Eng.Chem.,35,255(1943)	760 torr	H 561	G 312 -+
Dunlop,op.cit.	760 torr	H 562	G 315 -+
Wilson,op.cit.	760 torr	H 563	G 334 ab
Verhoeye,op.cit.	760 torr		G 330 ab
Masashi,Kagakukogaku,31,451(1967)	760 torr	H 564	G 319 -+
Kojima,op.cit.(1968)	760 torr		Ga 244 ab
Kojima,op.cit.(1969)	760 torr		G 317 ab
Sada,J.Chem.Eng.Jap.,8,191(1975)	760 torr		Ga 247 ab
Wilson,op.cit.	3087 torr		*G 335 -+ b
Sazonov,Zh.Prikl.Khim.,59,1451(1986)	25.0 C		Gb 177
Sada,op.cit.	35.0 C		G 320 ab
"	45.1 C		G 321 ab
"	55.0 C		G 322 ab
"	65.0 C		G 323 ab
"	75.0 C		*G 324 -+ b
Barr-David,J.Chem.Eng.Data,4,107(1959)	150.0 C	H 565	(Gb 169)

Notes:
1. ( ) indicates nonconverging Wij's using prescribed Antoine coefficients.
2. -, +, and _ after G ref. are two separate criterion tests (fail, pass, none); ones unnoted were ++
3. a and/or b after G ref. indicate inclusion in DECHEMA supplements' recommended Wij's
4. ? indicates inconsistent citation between compilations or supplements.
5. * indicates inclusion of failed criterion in recommended Wij's.

APPENDIX A   18

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10 DATA "CH3OH","H2O",23: 'MEOHH2O.DEC
11 DATA "GO 47",1,760.00,17,0,0,100.00,.0200,.1340,96.40,.0400,.2300,93.50,.0600,.3040,
        91.20,.0800,.3650,89.30,.1000,.4180,87.70,.1500,.5170,84.40
12 DATA .2000,.5790,81.70,.3000,.6650,78.00,.4000,.7290,75.30,.5000,.7790,73.10,.6000,
        .8250,71.20,.7000,.8700,69.30,.8000,.9150,67.50,.9000,.9580,66.00
13 DATA .9500,.9790,65.00,1,1,64.5
14 DATA "GO 52",1,760.00,14,.0321,.1900,95.30,.0372,.2220,94.00,.0523,.2940,92.50,.0595,
        .3080,91.50,.0750,.3520,89.90,.0876,.3900,88.10,.1540,.4900,85.10
15 DATA .1580,.5160,83.90,.1820,.5520,82.90,.2250,.59300,82.10,.2900,.6430,78.70,.3490,
        .7030,76.70,.8130,.9180,67.40,.9180,.9630,65.60
16 DATA "GO 71",1,760.00,21,.0293,.1831,95.20,.0346,.2107,94.50,.0406,.2363,93.70,
        .0422,.2652,92.80,.0557,.2978,91.80,.0644,.3265,90.90,.0737,.3608,90.00
17 DATA .0838,.3861,89.10,.0948,.4142,89.20,.2801,.6621,78.80,.3004,.6882,77.60,.3212,
        .6882,77.60,.3435,.7002,76.90,.3664,.7178,76.20,.3909,.7274,75.70
18 DATA .4141,.7428,75.10,.4391,.7597,74.60,.4637,.7668,74.00,.8457,.9360,67.20,.8867,
        .9632,66.60,.9293,.9771,65.70
19 DATA "GO 66",1,200.00,11,.0130,.0950,64.80,.0250,.1700,63.10,.0640,.3630,59.20,.1560,
        .5900,52.00,.2740,.6960,47.30,.4280,.7860,43.30,.5430,.8480,40.90
20 DATA .6250,.8720,39.50,.7220,.9050,38.10,.7950,.9370,37.10,.8850,.9660,35.80
21 DATA "GO 67",1,390.00,11,.0330,.2100,74.70,.0510,.3010,72.60,.1060,.4780,67.60,.1790,
        .6000,63.20,.2560,.6710,59.60,.3390,.7260,57.30,.4450,.7860,55.00
22 DATA .5230,.8140,53.20,.6240,.8620,51.30,.7490,.9150,49.00,.8740,.9590,47.40
23 DATA "GO 68",1,500.00,11,.0250,.1630,85.00,.0550,.3100,80.20,.1140,.4840,75.40,.2120,
        .6220,70.00,.3250,.6960,66.50,.4630,.7820,63.10,.5230,.8040,62.00
24 DATA .6140,.8450,59.70,.7090,.8870,58.70,.7720,.9130,57.70,.8800,.9580,56.00
25 DATA "GO 69",1,760.00,11,.0460,.2670,92.70,.0940,.4020,88.10,.1570,.5330,84.00,.2170,
        .6020,80.80,.3210,.6800,77.40,.4250,.7450,74.80,.5340,.7910,72.40
26 DATA .6320,.8290,70.50,.7270,.8830,68.70,.8170,.9200,67.30,.8910,.9560,66.10
27 DATA "GO 74",1,760.00,13,0,0,100.00,.0500,.2690,92.84,.1000,.4220,88.10,.2000,.5810,
        82.12,.3000,.6620,78.28,.4000,.7330,75.57,.5000,.7870,73.45
28 DATA .6000,.8310,71.52,.7000,.8760,69.70,.8000,.9200,67.97,.9000,.9620,66.27,.9500,
        .9820,65.40,1,1,64.59
29 DATA "GO 48",1,760.00,12,0,0,100.00,.0500,.2780,92.40,.1000,.4250,87.70,.2000,.6020,
        81.70,.3000,.6920,78.00,.4000,.7520,75.40,.5000,.7980,73.20
30 DATA .6000,.8380,71.20,.7000,.8780,69.40,.8000,.9150,67.70,.9000,.9600,66.00,1,1,64.60
31 DATA "GO 65",1,760.00,12,0,0,100.00,.0590,.2960,91.90,.1220,.4650,86.20,.1930,.5740,
        81.90,.2730,.6540,78.80,.3600,.7090,76.50,.4580,.7630,74.40
32 DATA .5680,.8160,72.30,.6930,.8720,70.20,.8380,.9310,67.60,.9150,.9670,66.20,1,1,64.70
33 DATA "GO 64",1,350.00,12,0,0,79.60,.0590,.3200,72.00,.1220,.4930,67.00,.1930,.5970,
        63.30,.2730,.6750,60.30,.3600,.7350,57.80,.4580,.7840,55.60
34 DATA .5680,.8340,53.60,.6930,.8850,51.60,.8380,.9380,49.30,.9150,.9700,47.90,1,1,46.40
35 DATA"GO 58",1,760.00,34,.0017,.0125,99.41,.0035,.0250,99.25,.0123,.0889,97.80,.0141,
        .0975,97.35,.0198,.1214,96.92,.0258,.1589,95.82,.0330,.1882,95.06
36 DATA .0357,.2145,94.13,.0525,.2746,92.24,.0740,.3560,90.00,.0872,.3950,88.57,.1079,
        .4400,86.93,.1289,.4776,85.37,.1635,.5370,83.38,.1912,.5724,81.95
37 DATA .2327,.6162,80.25,.2684,.6482,79.06,.2942,.6658,78.14,.3524,.7044,76.52,.4021,
        .7341,75.34,.4543,.7595,74.22,.5022,.7853,73.21,.5628,.8123,71.95
38 DATA .6243,.8350,70.90,.7173,.8773,69.15,.7898,.9098,68.07,.8231,.9225,67.57,.8426,
        .9300,67.17,.8574,.9385,66.90,.8720,.9422,66.89,.9185,.9638,65.98
39 DATA .9295,.9682,65.73,.9380,.9712,65.71,.9885,.9947,64.68
40 DATA "GO 60",1,760.00,27,.0115,.0678,97.44,.0198,.1214,96.92,.0258,.15899,95.82,.0330,
        .1882,95.06,.0357,.2145,94.13,.0525,.2746,92.24,.0740,.3560,90.00
41 DATA .0872,.3950,88.57,.1079,.4400,86.93,.1289,.4476,85.37,.1635,.5370,83.38,.1912,
        .5724,81.95,.2327,.6162,80.25,.2684,.6483,79.06,.2942,.6658,78.14
42 DATA .3524,.7044,76.52,.4021,.7341,75.34,.4543,.7595,74.22,.5022,.7853,73.21,.5628,
        .8123,71.95,.6243,.8350,70.90,.7173,.8773,69.15,.7898,.9098,68.07
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43 DATA .8426,.9300,67.17,.8574,.9385,66.90,.9295,.9682,65.73,.9380,.9712,65.71
44 DATA "GO 76",1,760.00,13,.0830,.3690,89.33,.1250,.4640,86.30,.1560,.5160,84.27,.2000,
        .5800,82.04,.2470,.6310,80.01,.3090,.6760,77.78,.4090,.7370,75.10
45 DATA .4630,.7660,73.95,.5340,.7980,72.48,.6000,.8260,71.21,.6670,.8560,70.11,.7630,
        .9010,68.33,.8500,.9330,66.80
46 DATA "GO 72",2,39.90,10,.2095,.6435,125.70,.2875,.7105,143.50,.3465,.7450,156.00,.4220,
        .7850,168.20,.5250,.8290,184.40,.5960,.8575,195.10
47 DATA .6880,.8910,211.30,.7760,.9220,225.20,.8825,.9615,242.40,.9510,.9825,257.90
48 DATA "GO 53",1,760.00,15,.0280,.1710,95.40,.0420,.2300,93.80,.0650,.3790,89.00,.1400,
        .4960,85.00,.1730,.5500,83.30,.2385,.6260,80.40,.3005,.6700,78.45
49 DATA .3485,.6970,77.10,.4515,.7630,74.10,.5215,.7860,73.20,.6020,.8175,72.00,.6910,
        .8665,70.20,.7930,.9090,68.60,.8470,.9340,67.50,.8910,.9540,66.60
50 DATA "GO 41",2,60.00,12,.0343,.2106,183.64,.0446,.2699,196.92,.0594,.3312,211.65,.0793,
        .3920,228.70,.1092,.4714,254.75,.1634,.5698,291.74
51 DATA .1961,.5989,309.50,.2705,.6699,353.18,.3670,.7462,395.79,.4619,.7889,431.10,.5665,
        .8223,466.95,.7582,.9010,538.25
52 DATA "GO 54",1,760.00,16,.0120,.1140,96.85,.0260,.1570,95.65,.1020,.4300,87.45,.1400,
        .5140,84.75,.1750,.5600,82.85,.4730,.7650,73.65,.5260,.7940,72.55
53 DATA .5400,.8010,72.35,.5650,.8050,71.95,.5850,.8160,71.45,.6620,.8570,70.55,.6750,
        .8650,69.85,.7140,.8780,69.05,.8500,.9300,66.85,.8900,.9560,66.15,.9200,.9650,65.65
54 DATA "GO 75",1,760.00,14,.0390,.1950,94.10,.0820,.3660,89.00,.1280,.4680,85.75,.1850,
        .5650,82.30,.2180,.6300,81.20,.2500,.6500,79.85,.3200,.6920,77.85
55 DATA .3350,.7020,76.85,.4630,.7830,74.40,.5640,.8340,71.85,.7500,.9050,68.45,.8250,
        .9300,67.30,.8300,.9350,67.20,.8600,.9390,66.90: 'N.B. values of #13&14?
56 DATA "GOa53",1,760.00,21,0,0,100.00,.0500,.2797,92.39,.1000,.4277,87.53,.1500,.5233,
        84.01,.2000,.5870,81.48,.2500,.6352,79.48,.3000,.6723,77.90
57 DATA .3500,.7036,76.56,.4000,.7317,75.36,.4500,.7592,74.19,.5000,.7834,73.16,.5500,
        .8065,72.20,.6000,.8287,71.29,.6500,.8496,70.45,.7000,.8718,69.58
58 DATA .7500,.8946,68.69,.8000,.9167,67.83,.8500,.9387,66.97,.9000,.9597,66.14,.9500,
        .9806,65.31,1,1,64.50
59 DATA "GOa55",1,760.00,16,.0380,.2110,94.20,.0580,.2810,91.80,.0880,.3930,88.30,.1230,
        .4620,86.30,.2480,.6230,79.50,.3260,.6820,77.00,.3280,.6620,77.20
60 DATA .4790,.7690,73.40,.6190,.8380,70.60,.6990,.8690,69.40,.7930,.9110,67.80,.8320,
        .9290,67.10,.8930,.9560,66.10,.9370,.9730,66.00,.9660,.9880,65.10,.9890,.9970,64.90
61 DATA "GOa58",1,760.00,12,0,0,100.00,.0200,.1300,96.20,.0360,.2070,93.90,.0650,.3250,
        90.30,.0840,.3840,88.80,.1550,.5250,84.00,.2450,.6200,79.50
62 DATA .3750,.7150,76.00,.5650,.8100,71.80,.7820,.9130,68.00,.8950,.9570,66.00,1,1,64.70
63 DATA "GOb29",2,24.99,14,.0444,.2777,31.49,.1429,.5669,47.29,.2385,.6894,59.88,.3173,
        .7428,68.23,.3891,.7870,74.71,.5082,.8377,84.41,.5873,.8673,91.03
64 DATA .6123,.8764,92.58,.6553,.8917,96.51,.7163,.9127,101.62,.8037,.9415,109.16,.8597,
        .9590,114.21,.9361,.9817,121.14,1,1,126.90
80 DATA "CH3OH-1",8.08097,1582.271,239.726: '15-84 C
90 DATA "H2O-1",8.07131,1730.630,233.426: '1-100 C
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1 DATA "C2H5OH","H2O",36: 'ETOHH2O.DEC
2 DATA "GO 154",1,760.00,15,.0190,.1700,95.50,.0721,.3891,89.00,.0966,.4375,86.70,.1238,
       .4704,85.30,.1661,.5089,84.10,.2337,.5445,82.70,.2608,.5580,82.30
3 DATA .3273,.5826,81.50,.3965,.6122,80.70,.5079,.6564,79.80,.5198,.6599,79.70,.5732,.6841,
       79.30,.6763,.7385,78.74,.7472,.7815,78.41,.8943,.8943,78.15
4 DATA "GOa136",1,705.00,34,0,0,97.60,.0110,.1200,94.90,.0170,.1670,93.40,.0290,.2500,
       91.10,.0280,.2500,91.20,.0460,.3220,88.50,.0460,.3200,88.70,.0500,.3340,88.30,.0500,
       .3330,88.30,.0660,.3880,86.50,.0650,.3870,86.60,.0710,.3970,86.00
5 DATA .0700,.3900,86.00,.0880,.4290,84.80,.1130,.4710,83.10,.1200,.4720,83.70,.1300,.4830,
       83.10,.1300,.4850,83.10,.1570,.5050,82.60,.1530,.5030,82.50,.1770,.5210,81.60,.1770,
       .5190,81.60,.2090,.5400,81.20,.2080,.5390,81.20,.2810,.5690,80.30
6 DATA .2790,.5670,80.30,.3090,.5820,79.80,.3780,.6080,79.00,.4600,.6380,78.00,.5190,.6650
       ,77.50,.5320,.6660,77.50,.6080,.7050,77.00,.7700,.7950,76.40,.7690,.7970,76.40
7 DATA "GOb86",1,495.00,11,0,0,88.20,.0748,.4641,76.50,.1995,.5646,72.10,.4732,.6553,
       69.30,.6215,.7167,68.20,.6918,.7590,68.20,.7423,.7815,68.00
8 DATA .7765,.8018,67.80,.8962,.9020,67.70,.9475,.9432,67.70,.9870,.9765,67.60
10 'DATA "C2H5OH","H2O",33: 'ETOHH2O.DEC
11 DATA "GO 165",1,760.00,11,.0180,.1790,95.50,.0540,.3375,90.60,.1240,.4700,85.40,.1760,
       .5140,83.70,.2300,.5420,82.75,.2880,.5700,82.00,.3850,.6120,81.00
12 DATA .4400,.6330,80.50,.5140,.6570,79.80,.6730,.7350,78.90,.8400,.8500,78.26
13 DATA "GO 181",1,760.00,34,.0028,.0320,99.30,.0118,.1130,96.90,.0137,.1570,96.00,.0144,
       .1350,96.00,.0176,.1560,95.60,.0222,.1860,94.80,.0246,.2120,93.80
14 DATA .0302,.2310,93.50,.0331,.2480,92.90,.0519,.3180,90.50,.0530,.3140,90.50,.0625,
       .3390,89.40,.0673,.3700,88.40,.0715,.3620,88.60,.0871,.4060,87.20
15 DATA .1260,.4680,85.40,.1430,.4870,84.50,.1720,.5050,84.00,.2060,.5300,83.40,.2100,
       .5270,83.00,.2550,.5520,82.30,.2840,.5670,82.00,.3210,.5860,81.40
16 DATA .3240,.5860,81.50,.3450,.5910,81.20,.4050,.6140,80.90,.4300,.6260,80.50,.4490,
       .6330,80.20,.5060,.6610,80.00,.5450,.6730,79.50,.6630,.7330,78.80
17 DATA .7350,.7760,78.50,.8040,.8150,78.40,.9170,.9060,78.30
18 DATA "GO 177",1,735.56,51,.0050,.0528,98.50,.0056,.0597,98.40,.0065,.0649,98.50,.0067,
       .0736,97.80,.0124,.1190,96.60,.0155,.1440,96.00,.0175,.1580,95.40
19 DATA .0180,.1630,95.00,.0292,.2240,92.80,.0363,.2250,92.00,.0374,.2710,92.20,.0440,
       .3000,90.90,.0538,.3280,90.00,.0570,.3480,89.70,.0607,.3460,89.20
20 DATA .0725,.3740,88.20,.0746,.3830,87.50,.0754,.3800,87.90,.0782,.3860,88.10,.0820,
       .4050,87.50,.0905,.4170,86.90,.0970,.4220,86.60,.1110,.4520,86.10
21 DATA .1120,.4500,85.80,.1180,.4640,85.40,.1270,.4760,85.30,.1470,.4920,84.70,.1470,
       .4910,84.60,.1490,.4950,84.50,.1720,.5120,84.00,.2030,.5240,83.30
22 DATA .2090,.5290,83.20,.2100,.5260,83.00,.2150,.5360,83.20,.2410,.5460,82.80,.2970,
       .5730,81.90,.3200,.5770,81.80,.3810,.6000,81.00,.3910,.6080,81.00
23 DATA .4320,.6210,80.70,.4520,.6230,80.60,.4970,.6530,80.00,.5070,.6560,80.10,.5670,
       .6840,79.50,.6850,.7430,78.90,.7670,.7960,78.40,.8380,.8460,78.30
24 DATA .8810,.8840,78.20,.9210,.9180,78.20,.9440,.9410,78.20,.9930,.9920,78.30
25 DATA "GO 179",1,2500.90,21,.0076,.0718,135.50,.0230,.1910,131.20,.0238,.1950,131.10,
       .0240,.2000,131.10,.0392,.2650,128.70,.0590,.3210,126.10
26 DATA .0675,.3380,125.40,.0866,.3910,123.30,.1010,.4110,122.50,.1200,.4330,121.30,.1350,
       .4540,120.40,.1840,.4920,119.40,.2630,.5360,117.10,.3240,.5560,116.30
27 DATA .4210,.6040,115.30,.4960,.6380,114.60,.5880,.6840,113.90,.6880,.7390,113.30,.8060,
       .8200,112.90,.8710,.8730,112.60,.9270,.9240,112.60
28 DATA "GO 162",1,755.00,15,0,0,100.00,.0050,.0740,97.60,.0350,.2770,91.60,.0540,.3490,
       88.70,.0900,.4370,86.00,.1860,.5210,83.00,.3290,.5810,81.40
29 DATA .5480,.6740,79.20,.6400,.7200,78.90,.7600,.7880,78.80,.8710,.8750,78.30,.9160,
       .9140,78.30,.9510,.9460,78.40,.9840,.9800,78.30,1,1,78.60
30 DATA "GO 188",1,760.00,14,.0097,.1035,98.30,.0270,.2248,93.50,.0427,.2967,90.70,.0646,
       .3612,88.45,.1476,.4870,84.24,.2144,.5475,82.20,.3182,.5810,81.35
31 DATA .4013,.6137,80.60,.5008,.6485,79.90,.5884,.6915,79.45,.6980,.7520,78.90,.7857,
       .8049,78.55,.8448,.8515,78.25,.9190,.9158,78.30
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32 DATA "GO 187",1,380.00,13,.0180,.1634,78.00,.0485,.3302,73.00,.1635,.5215,67.10,.2176,
      .5451,66.00,.3454,.5949,64.40,.4014,.6225,63.65,.4597,.6391,63.25
33 DATA .5400,.6792,62.75,.6300,.7195,62.40,.7013,.7617,62.08,.7845,.8120,61.90,.8661,
      .8730,61.60,.9071,.9103,61.55
34 DATA "GO 184",1,760.00,125,.0010,.0100,99.81,.0020,.0205,99.62,.0030,.0312,99.43,.0040,
      .0421,99.24,.0050,.0532,99.05,.0060,.0644,98.86,.0070,.0753,98.67,.0080,.0858,98.48,
      .0090,.0958,98.29,.0100,.1040,98.10,.0120,.1200,97.58
35 DATA .0140,.1360,97.06,.0160,.1509,96.54,.0180,.1655,96.02,.0200,.1800,95.50,.0220,
      .1943,94.93,.0240,.2080,94.46,.0260,.2205,93.94,.0280,.2327,93.42,.0300,.2442,92.90,
      .0350,.2695,91.85,.0400,.2905,91.05,.0450,.3075,90.47
36 DATA .0500,.3245,89.90,.0550,.3400,89.45,.0600,.3545,88.92,.0650,.360,88.50,.0700,
      .3775,88.13,.0750,.3885,87.76,.0800,.3990,87.45,.0850,.4091,86.77,.0950,.4283,86.46,
      .1000,.4370,86.20,.1050,.4450,85.96,.1100,.4528,85.73
37 DATA .1150,.4605,85.50,.1200,.4675,85.28,.1250,.4740,85.10,.1300,.4800,84.90,.1350,
      .4855,84.72,.1400,.4900,84.55,.1450,.4940,84.36,.1500,.4980,84.20,.1550,.5002,84.16,
      .1600,.5055,83.92,.1650,.5090,83.78,.1700,.5120,83.65
38 DATA .1750,.5145,83.50,.1800,.5175,83.37,.1850,.5200,83.25,.1900,.5230,83.12,.1950,
      .5255,83.00,.2000,.5280,82.90,.2100,.5330,82.78,.2200,.5375,82.55,.2300,.5420,82.43,
      .2400,.5460,82.28,.2500,.5505,82.16,.2600,.5545,82.05
39 DATA .2700,.5590,81.94,.2800,.5635,81.85,.2900,.5680,81.75,.3000,.5725,81.64,.3100,
      .5765,81.55,.3200,.5805,81.45,.3300,.5840,81.34,.3400,.5880,81.25,.3500,.5920,81.15,
      .3600,.5955,81.05,.3700,.5992,80.95,.3800,.6032,80.37
40 DATA .3900,.6068,80.75,.4000,.6102,80.66,.4100,.6135,80.57,.4200,.6170,80.48,.4300,
      .6205,80.39,.4400,.6245,80.29,.4500,.6280,80.25,.4600,.6320,80.18,.4700,.6355,80.10,
      .4800,.6395,80.03,.4900,.6435,79.96,.5000,.6475,79.89
41 DATA .5100,.6520,79.84,.5200,.6565,79.77,.5300,.6610,79.75,.5400,.6660,79.71,.5500,
      .6710,79.65,.5600,.6760,79.60,.5700,.6810,79.55,.5800,.6865,79.50,.5900,.6920,79.44,
      .6000,.6980,79.40,.6100,.7030,79.35,.6200,.7090,79.30
42 DATA .6300,.7145,79.27,.6400,.7200,79.20,.6500,.7255,79.15,.6600,.7310,79.10,.6700,
      .7365,79.05,.6800,.7420,79.00,.6900,.7475,78.95,.7000,.7530,78.89,.7100,.7590,78.86,
      .7200,.7650,78.80,.7300,.7710,78.76,.7400,.7770,78.71
43 DATA .7500,.7830,78.66,.7600,.7890,78.60,.7700,.7950,78.57,.7800,.8015,78.53,.7900,
      .8080,78.50,.8000,.8155,78.47,.8100,.8225,78.44,.8200,.8300,78.40,.8300,.8385,78.37,
      .8400,.8470,78.34,.8500,.8560,78.31,.8600,.8645,78.28
44 DATA .8700,.8730,78.24,.8800,.8806,78.21,.8900,.8905,78.18,.9000,.8990,78.20,.9100,
      .9075,78.25,.9190,.9158,78.30
45 DATA "GO 174",2,70.00,13,.0620,.3740,362.50,.0950,.4390,399.00,.1310,.4820,424.00,
      .1940,.5240,450.90,.2520,.5520,468.00,.3340,.5830,485.50
46 DATA .4010,.6110,497.60,.5930,.6910,525.90,.6800,.7390,534.30,.7930,.8160,542.70,.8100,
      .8260,543.10,.9430,.9410,544.50,.9470,.9450,544.50
47 DATA "GO 173",2,55.00,13,.0510,.3360,173.35,.0850,.4280,197.80,.1060,.4610,207.50,
      .1800,.5240,227.30,.2300,.5550,236.30,.3240,.5890,248.20
48 DATA .4290,.6280,258.00,.5530,.6800,267.00,.6850,.7460,274.90,.7740,.8010,278.40,.8100,
      .8290,279.40,.8940,.8980,280.60,.9540,.9520,280.50
49 DATA "GO 172",2,40.00,13,.0620,.3740,75.14,.0770,.4060,89.00,.0980,.4500,94.60,.1280,
      .4880,101.50,.1810,.5430,109.00,.3190,.5980,116.90
50 DATA .3990,.6280,121.05,.5110,.6760,125.50,.6830,.7460,130.40,.7740,.8090,132.50,.8100,
      .8290,132.80,.8750,.8790,133.50,.9570,.9560,133.80
51 DATA "GO 183",1,706.66,12,.0080,.0880,95.90,.0180,.1650,93.80,.0260,.2320,91.80,.0280,
      .2290,91.60,.0700,.3900,86.40,.0860,.4190,85.60,.1050,.4540,84.00
52 DATA .1200,.4710,83.40,.2910,.5720,79.90,.3610,.5970,79.40,.4070,.6180,78.80,.5610,
      .6820,77.70
53 DATA "GO 153",1,760.00,18,.0210,.1990,94.30,.0330,.2720,91.90,.0500,.3530,90.00,.0850,
      .4110,87.30,.1050,.4580,86.10,.1250,.4880,85.20,.1350,.4840,84.70
54 DATA .3150,.5710,81.80,.3210,.5720,81.60,.4030,.6190,80.60,.4030,.6250,80.20,.5560,
      .6750,79.50,.6020,.6950,79.20,.6430,.7130,79.10,.6890,.7410,78.60,.8050,.8140,78.30,

.9260,.9170,78.30,.9870,.9850,78.20
55 DATA "GO 171",1,760.00,21,0,0,100.00,.0051,.0486,98.62,.0069,.0752,98.06,.0162,.1442,
95.97,.0316,.2429,92.95,.0823,.3985,87.07,.1065,.4513,85.67,.1368,.4812,84.53,.1450,
.4805,84.24,.1770,.5095,83.50,.4034,.6120,80.59,.5733,.6849,79.35
56 DATA .7152,.7607,78.63,.7715,.7961,78.43,.8160,.8246,78.32,.8180,.8322,78.31,.8386,
.8450,78.28,.8780,.8789,78.24,.9167,.9117,78.22,.9910,.9892,78.37,1,1,78.46
57 DATA "GO 170",1,740.00,11,.0500,.32340,89.75,.1000,.4390,85.25,.2000,.5340,82.10,.3000,
.5770,80.70,.4000,.6130,79.75,.5000,.6520,78.90,.6000,.7000,78.25
58 DATA .7000,.7500,77.60,.8000,.8200,77.10,.9000,.8998,76.90,.9500,.9470,76.90
59 DATA "GO 169",1,500.00,11,.0500,.3180,79.60,.1000,.4530,75.70,.2000,.5430,72.55,.3000,
.5850,71.05,.4000,.6210,70.25,.5000,.6580,69.60,.6000,.7060,69.05
60 DATA .7000,.7600,68.55,.8000,.8240,68.15,.9000,.9005,68.00,.9500,.9462,68.00
61 DATA "GO 168",1,250.00,11,.0500,.3070,63.90,.1000,.4490,59.95,.2000,.5540,56.70,.3000,
.5990,55.15,.4000,.6340,54.40,.5000,.6790,54.00,.6000,.7150,53.65
62 DATA .7000,.7670,53.35,.8000,.8310,53.10,.9000,.9017,53.00,.9500,.9419,53.00
63 DATA "GO 167",1,100.00,11,.0500,.2840,44.90,.1000,.4390,41.55,.2000,.5600,38.25,.3000,
.6040,37.10,.4000,.6410,36.45,.5000,.6770,35.90,.6000,.7210,35.45
64 DATA .7000,.7730,35.00,.8000,.8360,34.60,.9000,.9078,34.35,.9500,.9512,34.25
65 DATA "GOa118",2,50.00,14,0,0,92.51,.0267,.2371,108.66,.0743,.4127,138.34,.1333,.5225,
170.22,.2174,.5817,187.71,.2795,.6096,192.64,.3673,.6332,199.98
66 DATA .4317,.6500,202.48,.5660,.7000,200.72,.6641,.7394,215.49,.7802,.8064,211.44,.8308,
.8454,222.87,.9070,.9070,225.41,1,1,220.60
67 DATA "GOa133",1,760.00,21,0,0,100.00,.0500,.3372,90.00,.1000,.4521,85.93,.1500,.5056,
83.97,.2000,.5359,82.90,.2500,.5589,82.14,.3000,.5794,81.52,.3500,.5987,80.99,.4000,
.6177,80.52,.4500,.6371,80.10,.5000,.6558,79.75,.5500,.6765,79.42
68 DATA .6000,.6989,79.13,.6500,.7250,78.85,.7000,.7550,78.60,.7500,.7840,78.42,.8000,
.8167,78.30,.8500,.8591,78.22,.9000,.8959,78.20,.9500,.9474,78.24,1,1,78.33
69 DATA "GOa125",2,25.00,12,0,0,23.75,.0523,.3164,33.17,.0916,.4334,38.44,.1343,5037,
43.42,.1670,.5449,45.69,.2022,.5683,47.21,.2848,.6105,50.33
70 DATA .3368,.6286,51.17,.4902,.6790,53.95,.5820,.7095,55.71,.7810,.8161,58.08,1,1,59.01
71 DATA "GOa126",2,25.00,10,.0550,.3230,33.33,.1246,.4970,42.06,.2142,.5790,47.98,.3941,
.6480,52.41,.5496,.7005,55.17,.7006,.7685,56.81,.7842,.8185,57.72
72 DATA .8396,.8585,58.69,.8790,.8895,58.49,.9365,.9390,59.10
73 DATA "GOa132",1,740.00,18,.0055,.0599,97.70,.0136,.1389,95.75,.0231,.2092,93.75,.0346,
.2692,91.80,.0520,.3306,89.40,.0791,.4018,86.70,.1078,.4528,84.95
74 DATA .1292,.4796,84.03,.1573,.5039,83.10,.1665,.5153,82.82,.1984,.5294,82.15,.2085,
.5307,82.00,.3173,.5782,80.53,.4144,.6176,79.60,.4904,.6468,79.00,.4990,.6547,78.90,
.6259,.7131,78.00,.7552,.7865,77.30
75 DATA "GOa131",1,500.00,21,.0120,.1181,85.13,.0252,.2055,82.80,.0390,.2708,80.90,.0412,
.2852,80.55,.0439,.2935,80.30,.0557,.3369,79.10,.0580,.3461,78.80,.0737,.3946,77.40,
.0994,.4449,75.80,.1424,.4990,74.00,.1803,.5346,72.95
76 DATA .2021,.5412,72.50,.2141,.5533,72.30,.2207,.5479,72.20,.2250,.5547,72.10,.3369,
.6027,70.75,.3479,.5939,70.65,.4713,.6484,69.80,.4796,.6297,69.70,.5754,.6849,69.15,
.7096,.7599,68.50
77 DATA "GOa130",1,250.00,28,.0093,.0791,69.65,.0244,.1875,67.20,.0408,.2700,65.05,.0452,
.2910,64.50,.0573,.3392,63.20,.0636,.3592,62.65,.0660,.3669,62.40,.0865,.4008,60.80,
.0921,.4349,60.45,.1230,.4892,58.80,.1298,.4953,58.62
78 DATA .1378,.5052,58.30,.1603,.5255,57.65,.1677,.5300,57.40,.1740,.5412,57.30,.2123,
.5615,56.45,.2197,.5684,56.30,.2336,.5768,56.10,.2918,.6027,55.30,.2959,.6071,55.20,
.3583,.6343,54.75,.3678,.6282,54.70,.5039,.6758,54.00
79 DATA .5140,.6628,53.95,.5560,.6841,53.80,.6071,.7200,53.60,.7236,.7617,53.35,.7325,
.7731,53.30
80 DATA "GOa129",1,100.00,17,.0128,.1030,49.10,.0381,.2484,46.00,.0417,.2622,45.70,.0457,
.2812,45.30,.0552,.3156,44.50,.0589,.3297,44.20,.0737,.3766,43.10,.0994,.4415,41.60,
.1424,.5102,39.80,.1791,.5466,38.70,.1950,.5601,38.25
81 DATA .2068,.5754,38.10,.2250,.5817,37.85,.4678,.6741,36.05,.4819,.6628,36.00,.5896,

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        .7325,35.50,.7010,.7470,35.00
82 DATA "GOa149",2,75.00,9,.0800,.4300,465.00,.1450,.5100,520.00,.2300,.5700,555.00,.3530,
        .6240,600.00,.3710,.6310,595.00,.3770,.6200,630.00,.5280,.6600,632.00,.7750,.8000,
        655.00,.8600,.8700,658.00
83 DATA "GOb110",1,760.00,9,.0750,.4000,88.50,.1200,.4750,85.20,.2300,.5500,82.40,.3410,
        .5950,81.20,.5120,.6570,79.80,.5420,.6650,79.50,.6620,.7330,78.80,.7600,.7920,78.30,
        .8600,.8700,78.20
84 DATA "GOb92",1,760.00,9,.0180,.1900,94.90,.0190,.2050,94.40,.0530,.3640,89.30,.0820,
        .4300,87.10,.1520,.5000,84.20,.2250,.5450,82.50,.8000,.8380,78.20,.9160,.9140,78.00,
        1,1,78.30
85 DATA "GOb91",1,760.00,19,.0044,.0510,98.93,.0110,.1230,97.05,.0340,.2610,92.30,.0680,
        .3830,88.32,.0770,.4110,87.47,.1160,.4640,85.49,.1350,.4760,84.75
86 DATA .1470,.4990,84.34,.1770,.5160,83.47,.1780,.5190,83.42,.2070,.5360,82.94,.2330,
        .5440,82.50,.2360,.5410,82.56,.2700,.5620,81.99,.2870,.5720,81.84,.3610,.6050,80.90,
        .3700,.6010,80.92,.4800,.6450,79.91,.9040,.9000,76.15
87 DATA "GOb108",2,24.99,14,0,0,23.73,.0698,.3765,35.59,.1937,.5668,46.91,.2797,.6097,
        49.88,.3936,.6465,52.34,.4551,.6666,53.41,.5396,.6977,54.90
88 DATA .5448,.6997,54.91,.5818,.7148,55.51,.6032,.7239,55.77,.6271,.7344,56.16,.7728,
        .8099,57.82,.8724,.8816,58.50,1,1,58.98
89 DATA "GOb111",1,755.00,21,0,0,100.00,.0690,.3610,88.60,.1250,.4760,85.40,.1680,.5110,
        84.30,.3830,.6080,81.10,.4500,.6330,80.10,.7090,.7580,78.50,.7620,.7910,78.40,.7800,
        .8030,78.40,.8660,.8710,78.20,.8760,.8780,78.20
90 DATA .9030,.9020,78.20,.9070,.9050,78.20,.9140,.9110,78.30,.9230,.9200,78.20,.9570,
        .9530,78.30,.9760,.9730,78.30,.9810,.9780,78.30,.9920,.9900,78.30,.9970,.9960,78.30,
        1,1,78.30
91 DATA "GOb107",2,75.00,7,0,0,289.10,.0541,.3695,428.00,.1110,.4706,499.00,.2075,.5414,
        553.50,.2912,.5748,579.00,.4829,.6411,622.00,.8232,.8330,668.00
95 DATA "C2H5OH-1",8.11220,1592.864,226.184
96 DATA "H2O-1",8.07131,1730.630,233.426
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10 DATA "C3H7OH","H2O",17: 'IPROHH2O.DEC
11 DATA "GO 334",1,760.00,26,0,0,100.00,.0115,.1630,95.17,.0160,.2215,93.40,.0365,.3655,
        88.05,.0570,.4565,84.57,.1000,.5015,82.70,.1215,.5120,82.32,.1665,.5215,81.99,.1895,
        .5375,81.58,.1935,.5320,81.75,.2450,.5390,81.62,.2853,.5530,81.23
12 DATA .2975,.5540,81.29,.2980,.5510,81.28,.3835,.5700,80.90,.4460,.5920,80.67,.5145,
        .6075,80.35,.5590,.6255,80.31,.6460,.6645,80.15,.6605,.6715,80.16
13 DATA .6955,.6915,80.11,.7650,.7370,80.23,.8090,.7745,80.37,.8725,.8340,80.70,.9535,
        .9325,81.45,1,1,82.25
14 DATA "GO 333",1,380.00,25,0,0,81.68,.0065,.0925,79.20,.0410,.3905,70.12,.0605,.4565,
        67.76,.0770,.5100,66.25,.1305,.5255,65.59,.1765,.5365,65.31,.2620,.5465,65.02,.2680,
        .5490,64.98,.3350,.5625,64.61,.3915,.5700,64.60,.4765,.5960,64.18
15 DATA .5865,.6335,63.95,.6585,.6685,63.90,.6715,.6740,63.93,.6930,.6875,63.91,.7450,
        .7200,63.96,.7565,.7280,63.96,.7980,.7600,63.99,.8530,.8100,64.24,.8760,.8630,64.51,
        .8865,.8435,64.56,.8935,.8510,64.64,.9285,.8935,64.90,1,1,66.02
16 DATA "GO 332",1,190.00,24,0,0,65.29,.0075,.0985,62.86,.0175,.1915,60.41,.0300,.2940,
        57.66,.0485,.4045,54.70,.0840,.4840,51.99,.1500,.5210,51.12,.1625,.5255,50.81,.2115,
        .5385,50.47,.2725,.5510,50.41,.3860,.5725,49.97,.4765,.5955,49.57
17 DATA .5710,.6270,49.32,.5890,.6340,49.34,.6645,.6670,49.33,.6860,.6790,49.35,.7075,
        .6910,49.23,.7530,.7200,49.39,.7580,.7235,49.40,.7940,.7500,49.55,.8545,.8035,49.86,
        .8870,.8390,50.00,.9520,.9230,50.62,1,1,51.39
18 DATA "GO 331",1,95.00,24,0,0,50.71,.0055,.0600,49.17,.0140,.1655,47.10,.0345,.3105,
        43.44,.0510,.4055,41.19,.0795,.4820,39.01,.1395,.5165,37.85,.1850,.5285,37.59,.2610,
        .5475,37.14,.3875,.5705,36.87,.5080,.6030,36.14,.5725,.6250,36.17
19 DATA .6495,.6565,36.23,.6505,.6565,36.38,.6580,.6605,36.21,.6860,.6740,36.01,.7350,
        .7040,36.07,.7385,.7055,35.78,.7400,.7070,36.23,.7715,.7275,36.33,.8195,.7665,36.39,
        .8840,.8300,37.04,.9425,.9040,37.65,1,1,38.05
20 DATA "GO 330",1,760.00,11,.0450,.4070,86.40,.1240,.4970,82.85,.1420,.4990,82.60,.2000,
        .5180,82.16,.2400,.5270,81.80,.4220,.5720,80.86,.4650,.5900,80.62,.6120,.6420,80.25,
        .7140,.7000,80.13,.7700,.7430,80.23,.9150,.8800,81.25
21 DATA "GO 317",1,760.00,20,0,0,100.00,.0045,.0815,97.57,.0069,.1405,96.20,.0127,.2185,
        93.66,.0357,.3692,87.84,.0678,.4647,84.28,.1330,.5036,82.84,.1651,.5153,82.52,.3204,
        .5456,81.52,.3336,.5489,81.45,.3752,.5615,81.19,.4720,.5860,80.77
22 DATA .4756,.5886,80.73,.5197,.6033,80.58,.5945,.6330,80.52,.7880,.7546,80.46,.8020,
        .7680,80.55,.9303,.9010,81.32,.9660,.9525,81.85,1,1,82.39
23 DATA "GO 320",2,35.01,8,.0463,.3718,64.40,.0957,.4697,74.60,.1751,.5182,79.50,.2815,
        .5460,83.10,.4778,.5961,85.90,.6046,.6389,87.00,.7695,.7231,86.50,.8590,.8000,84.70
24 DATA "GO 321",2,45.05,8,.0462,.3936,114.40,.0957,.4818,130.60,.1751,.5211,138.30,.2815,
        .5455,143.50,.4778,.5981,148.80,.6046,.6411,150.60,.7694,.7242,149.80,.8589,.8026,
        146.80
25 DATA "GO 322",2,55.03,8,.0460,.4075,192.80,.0957,.4877,217.00,.1751,.5195,228.10,.2815,
        .5418,236.50,.4778,.6002,245.40,.6046,.6463,248.90,.7693,.7294,248.40,.8588,.8067,
        244.40
26 DATA "GO 323",2,65.04,8,.0461,.4166,312.30,.0957,.4921,348.40,.1751,.5190,365.00,.2815,
        .5404,377.80,.4779,.5993,391.70,.6046,.6450,396.80,.7692,.7296,396.50,.8587,.8103,
        389.80
27 DATA "GOa247",1,760.00,8,.0460,.4210,85.86,.0950,.4870,83.71,.1750,.5140,82.71,.2810,
        .5400,81.80,.4770,.5940,80.76,.6040,.6480,80.22,.7700,.7400,80.03,.8600,.8190,80.64
28 DATA "GOa243",1,757.70,27,.0154,.2349,93.19,.0319,.3641,88.98,.0383,.4139,86.97,.0771,
        .4799,83.76,.1134,.5067,82.99,.1248,.5069,82.63,.1934,.5228,81.97,.2174,.5227,82.21,
        .2668,.5391,81.55,.2688,.5389,82.10,.3229,.5456,82.65
29 DATA .3323,.5557,81.64,.4005,.5804,81.28,.4107,.5702,81.55,.4616,.5876,80.93,.4757,
        .5900,80.77,.5332,.6112,80.69,.5741,.6287,80.42,.6492,.6653,80.29,.6559,.6688,80.53,
        .6686,.6884,80.02,.8639,.6841,80.71,.7595,.7359,80.58
30 DATA .8684,.8319,80.86,.9222,.8975,81.55,.9729,.9656,81.95,.9999,.9997,82.37
31 DATA "GOa242",1,192.20,20,.0091,.1899,60.64,.0276,.3429,56.41,.0419,.4022,54.72,.0695,
        .4854,52.69,.0721,.4860,52.76,.1537,.5318,51.16,.2240,.5450,50.89,.2636,.5531,50.56,
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                .2854,.5559,50.33,.2997,.5568,50.49,.3077,.5601,50.49
32 DATA .4188,.5804,50.10,.5731,.6256,49.52,.7421,.7136,49.48,.7577,.7248,49.59,.7803,
        .7248,49.78,.8337,.7864,49.80,.9089,.8667,50.38,.9227,.8851,50.72,.9963,.9945,51.51
33 DATA "GOa241",1,94.80,14,.0091,.1557,47.51,.0412,.3845,41.78,.0747,.4721,39.49,.2743,
        .5549,37.43,.3758,.5723,37.09,.4107,.5784,36.74,.5049,.6034,36.49,.6377,.6509,36.07,
        .6461,.6554,36.26,.7435,.7098,36.39,.7477,.7082,36.46
34 DATA .8514,.7947,35.56,.9728,.9571,38.13,.9780,.9667,37.99
35 DATA "GOa244",1,760.00,21,0,0,100.00,.0500,.4394,85.50,.1000,.4952,83.23,.1500,.5129,
        82.55,.2000,.5247,82.14,.2500,.5352,81.82,.3000,.5460,81.53,.3500,.5579,81.26,.4000,
        .5705,81.02,.4500,.5841,80.81,.5000,.6000,80.62,.5500,.6186,80.46
36 DATA .6000,.6409,80.33,.6500,.6658,80.25,.7000,.6989,80.25,.7500,.7279,80.30,.8000,
        .7670,80.45,.8500,.8115,80.70,.9000,.8642,81.07,.9500,.9270,81.59,1,1,82.24
37 DATA "GOb173",1,381.20,13,.0610,.4657,68.29,.0614,.4732,68.04,.0994,.5091,66.53,.1075,
        .5157,66.58,.1529,.5208,66.02,.2707,.5467,65.22,.4010,.5737,64.66
38 DATA .4629,.5910,65.45,.4994,.6010,64.15,.5159,.6069,64.22,.5492,.6172,64.08,.7149,
        .7005,63.99,.8856,.8448,64.80
39 DATA "GOb177u",2,25.00,14,0,0,23.71,.0240,.2420,31.95,.1049,.4840,41.10,.1960,.5390,
        45.38,.3189,.5720,47.71,.4445,.5980,49.05,.5543,.6220,49.26
40 DATA .6119,.6400,49.41,.6568,.6600,49.88,.6846,.6730,49.86,.7336,.7070,49.50,.8325,
        .7760,48.70,.9097,.8580,46.70,1,1,44.00
41 'DATA "GOb169u",2,150.00,19,.0040,.0940,3878.60,.0100,.1510,4137.20,.0140,.2330,
        4550.90,.0260,.3150,5068.10,.0500,.3820,5792.10,.1040,.4350,6050.60,.1640,.4610,
        6205.80,.2530,.5010,6412.60,.2670,.4900,6412.60,.3780,.5270,6567.80
42 'DATA .4950,.5740,6774.70,.5700,.6110,6826.40,.2880,.6210,6826.40,.6610,.6670,6826.40,
        .7100,.6990,6878.10,.7450,.7260,6826.40,.8180,.7880,6774.70,.9050,.8800,6619.50,
        .9410,.9230,6464.40
90 DATA "C3H7OH-1",8.87829,2010.330,252.636
91 DATA "H2O-1",8.07131,1730.630,233.426
1000 READ A$,B$,M
1010 READ A$,A,B,N: PRINT A$,A,B,N
1020 FOR I=1 TO N: READ X,Y,Z: PRINT I,Z,X,Y: NEXT I
1030 J=J+1: PRINT "#";J: WHILE INKEY$="": WEND: GOTO 110
1035 PRINT "#";J: WHILE INKEY$="": WEND: NEXT J
1040 LPRINT: LPRINT A$: FOR J=1 TO M: FOR I=J+1 TO M
1050 IF A$(I)>A$(J) THEN GOTO 170
1060 D$=A$(I): A$(I)=A$(J): A$(J)=D$
1070 NEXT I: LPRINT A$(J),,: NEXT J
```

```
10 DATA "C3H6O","H2O",11: 'ACETH2O.DEC
11 DATA "GO 242",1,760.00,13,.0100,.3350,87.80,.0230,.4620,83.00,.0410,.5850,76.50,.1200,
      .7560,66.20,.2640,.8020,61.80,.3000,.8090,61.10,.4440,.8320,60.00
12 DATA .5060,.8370,59.70,.5380,.8400,59.50,.6090,.8470,58.90,.6610,.8600,58.50,.7930,
      .9000,57.40,.8500,.9170,57.10
13 DATA "GO 248",2,60.00,11,0,0,149.00,.0333,.5600,339.00,.0720,.7050,485.00,.1170,.7680,
      577.00,.1710,.7730,640.00,.2360,.8110,682.00,.3180,.8230,714.00,.4200,.8430,740.00,
      .5540,.8680,774.00,.7370,.8800,808.00,1,1,860.00
14 DATA "GO 234",1,760.00,21,.0115,.2791,92.00,.0221,.4488,85.20,.0638,.6809,72.10,.1164,
      .7777,65.30,.1727,.8073,62.70,.3085,.8309,60.90,.4439,.8421,60.30,.5096,.8524,59.80,
      .5228,.8512,59.80,.6232,.8603,59.40,.6829,.8723,58.80
15 DATA .7257,.8790,58.75,.7629,.8871,58.35,.8208,.9037,58.10,.8655,.9208,57.70,.9004,
      .9353,57.60,.9237,.9472,57.70,.9383,.9562,57.00,.9638,.9715,56.80,.9747,.9793,56.60,
      .9840,.9844,56.50
16 DATA "GO 240",1,500.00,14,0,0,88.70,.0280,.5070,71.40,.0610,.7330,62.30,.0750,.7260,
      59.60,.1100,.7710,56.80,.1490,.7870,55.00,.1570,.8140,52.70
17 DATA .2460,.8350,51.30,.3920,.8570,49.40,.4860,.8650,48.60,.6400,.8740,47.90,.7650,
      .8930,46.50,.8820,.9330,45.70,.9480,.9650,45.10
18 DATA "GO 235",1,760.00,9,.0500,.6200,74.00,.0820,.7200,68.90,.1250,.7710,65.80,.2200,
      .8000,62.90,.4450,.8310,62.70,.6600,.8660,58.30,.7600,.8880,57.80,.8650,.9300,57.30,
      .9300,.9600,57.60
19 DATA "GO 250",1,760.00,13,.0490,.6050,76.25,.0690,.6780,72.40,.1270,.7530,66.45,.2000,
      .7900,62.75,.2760,.8040,62.34,.4000,.8260,60.90,.4950,.8320,60.17
20 DATA .6500,.8550,58.80,.6940,.8620,58.47,.7500,.8760,57.95,.8290,.9030,57.25,.9000,
      .9360,56.75,.9400,.9590,56.45
21 DATA "GO 237",1,760.00,19,.0500,.6381,74.80,.1000,.7301,68.53,.1500,.7716,65.26,.2000,
      .7916,63.59,.2500,.8034,62.60,.3000,.8124,61.87,.3500,.8201,61.26,.4000,.8269,60.75,
      .4500,.8326,60.35,.5000,.8387,59.95,.5500,.8455,59.54
22 DATA .6000,.8532,59.12,.6500,.8615,58.71,.7000,.8712,58.29,.7500,.8817,57.90,.8000,
      .8950,57.49,.8500,.9118,57.08,.9000,.9335,56.68,.9500,.9627,56.30
23 DATA "GO 236",1,760.00,27,0,0,100.00,.0100,.2975,90.66,.0200,.4451,84.75,.0300,.5336,
      80.60,.0400,.5922,77.50,.0500,.6340,75.13,.0750,.7000,70.87,.1000,.7384,68.19,.1250,
      .7636,66.32,.1500,.7813,65.02,.2000,.8047,63.39,.2500,.8194,62.24
24 DATA .3000,.8295,61.45,.3500,.8369,60.78,.4000,.8426,60.39,.4500,.8470,60.08,.5000,
      .8518,59.91,.5500,.8571,59.80,.6000,.8634,59.55,.6500,.8706,59.25
25 DATA .7000,.8791,58.79,.7500,.8893,58.44,.8000,.9017,58.07,.8500,.9172,57.50,.9000,
      .9317,57.07,.9500,.9634,56.50,1,1,56.14
26 DATA "GOa194",2,100.00,22,.0033,.0902,832.61,.0040,.1090,848.12,.0045,.1180,879.15,
      .0080,.2070,977.41,.0480,.5450,1680.73,.0820,.6130,1835.88,.0980,.6370,2001.37,
      .1080,.6320,2089.28,.2200,.7050,2301.31,.3080,.7150,2399.57
27 DATA .3160,.7190,2404.74,.3970,.7270,2503.00,.4800,.7470,2606.43,.5260,.7460,2570.23,
      .6950,.8010,2678.83,.7150,.8140,2621.95,.7420,.8230,2699.52
28 DATA .7710,.8370,2720.20,.8540,.8780,2756.40,.9440,.9460,2766.75,.9710,.9720,2761.58,
      .9770,.9780,2766.75
29 DATA "GOa195",2,35.00,21,0,0,42.20,.0500,.7060,137.50,.1000,.8160,200.10,.1500,.8440,
      232.70,.2000,.8590,253.10,.2500,.8710,265.60,.3000,.8780,274.40,.3500,.8820,280.40,
      .4000,.8850,284.90,.4500,.8880,289.00,.5000,.8920,293.20
30 DATA .5500,.8970,298.00,.6000,.9010,302.60,.6500,.9070,307.40,.7000,.9130,312.40,.7500,
      .9200,317.50,.8000,.9290,322.90,.8500,.9390,328.70,.9000,.9530,335.20,.9500,.9720,
      342.10,1,1,349.10
31 DATA "GOb141",1,760.00,13,0,0,100.00,.0500,.6310,75.38,.1000,.7310,68.76,.2000,.7920,
      63.98,.3000,.8200,61.84,.4000,.8340,60.73,.5000,.8480,59.87
32 DATA .6000,.8580,59.29,.7000,.8740,58.52,.8000,.8940,57.65,.9000,.9380,56.65,.9500,
      .9630,56.36,1,1,56.09
90 DATA "ME2CO-1",7.11714,1210.595,229.664
91 DATA "H2O-1",8.07131,1730.630,233.426
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```basic
10 DATA "C4H8O","H2O",5: 'MEKH2O.DEC
11 DATA "GO 360?",1,200.00,7,0,0,66.40,.0380,.7090,41.30,.6740,.7260,39.80,.7770,.7500,
        39.90,.8130,.7630,40.00,.9030,.8250,40.60,1,1,41.50
12 DATA "GO 362?",1,500.00,10,0,0,88.60,.0340,.6520,64.80,.6690,.6810,62.00,.7040,.6910,
        62.00,.7310,.6970,62.00,.7780,.7120,63.20,.8370,.7410,62.50,.8600,.7630,62.70,.9060,
        .8080,63.50,1,1,66.30
13 DATA "GO 363",1,760.00,10,0,0,100.00,.0480,.6640,73.90,.6690,.6580,73.30,.7310,.6760,
        73.40,.8000,.6970,73.60,.8420,.7240,74.00,.8640,.7480,74.30,.8840,.7690,74.80,.9130,
        .8080,75.60,1,1,79.60
17 DATA "GOb204",1,760.00,33,0,0,100.00,.0021,.1075,96.88,.0052,.2273,92.95,.0086,.3231,
        89.57,.0127,.4136,85.91,.0208,.5132,81.30,.0342,.6027,76.37,.0375,.6129,75.62,.0440,
        .6372,74.29,.0474,.6497,73.72,.0488,.6502,73.49,.0505,.6512,73.43
18 DATA .0511,.6516,73.41,.5801,.6516,73.41,.6223,.6518,73.40,.6520,.6520,73.39,.6806,
        .6534,73.40,.7081,.6582,73.45,.7164,.6614,73.48,.7484,.6725,73.61,.7976,.7063,73.88,
        .8332,.7402,74.37,.8691,.7748,74.97,.8948,.8061,75.54
19 DATA .9158,.8329,76.07,.9324,.8590,76.58,.9478,.8858,77.14,.9652,.9198,77.87,.9789,
        .9488,78.51,.9851,.9632,78.81,.9919,.9795,79.16,.9985,.9961,79.51,1,1,79.60
20 DATA "GOb205",1,760.00,27,0,0,100.00,.0010,.0142,99.65,.0012,.0104,99.74,.0013,.0175,
        99.56,.0013,.0280,99.26,.0013,.0207,99.46,.0014,.0240,99.39,.0014,.0297,99.20,.0015,
        .0352,99.07,.0016,.0387,98.98,.0016,.0412,98.91,.0018,.0427,98.84
21 DATA .8217,.7251,74.09,.8580,.7527,74.50,.8701,.7647,74.67,.9086,.8199,75.56,.9233,
        .8334,75.87,.9319,.8468,76.12,.9372,.8538,76.25,.9379,.8621,76.38,.9477,.8729,76.63,
        .9552,.8869,76.91,.9639,.9024,77.20,.9669,.9120,77.43
22 DATA .9786,.9415,78.11,.9805,.9456,78.19,1,1,79.56
34 'DATA "GO 359?",2,73.60,6,.5872,.6530,758.00,.6500,.6590,760.00,.7000,.6680,760.00,
        .8000,.7110,748.00,.9000,.7960,714.00,1,1,619.00
35 'DATA "GOa277",1,760.00,9,.0400,.6000,75.30,.0550,.6450,73.60,.6000,.6520,73.60,.6610,
        .6610,73.50,.7100,.6750,73.60,.7600,.6850,73.80,.8000,.7100,73.90,.9100,.8100,75.20,
        .9500,.8800,77.00
36 'DATA "GOa278",1,760.00,8,.0400,.6000,75.30,.6000,.6520,73.50,.6610,.6610,73.50,.7100,
        .6750,73.60,.7600,.6850,73.80,.8000,.7100,73.90,.9100,.8100,75.20,.9500,.8800,77.00
90 DATA "MeEtCO-1",7.06356,1261.340,221.969
91 DATA "H2O-1",8.07131,1730.630,233.426
1000 READ A$,B$,M
1010 READ A$,A,B,N: PRINT A$,A,B,N
1020 FOR I=1 TO N: READ X,Y,Z: PRINT I,Z,X,Y: NEXT I
1030 J=J+1: PRINT "#";J: WHILE INKEY$="": WEND: GOTO 110
1035 PRINT "#";J: WHILE INKEY$="": WEND: NEXT J
1040 LPRINT: LPRINT A$: FOR J=1 TO M: FOR I=J+1 TO M
1050 IF A$(I)>A$(J) THEN GOTO 170
1060 D$=A$(I): A$(I)=A$(J): A$(J)=D$
1070 NEXT I: LPRINT A$(J),,: NEXT J
```

10 DATA "CH3OH","H2O",17: 'MEOHH2O.HIR
11 DATA 513,1,735.00,8,.0084,.1030,96.50,.0258,.2270,92.30,.0680,.3910,87.50,.1370,.5680,
        80.10,.2400,.6800,75.90,.4800,.7900,70.60,.5720,.8200,68.70
12 DATA .7410,.9060,66.40
13 DATA 514,1,760.00,16,.0531,.2834,92.90,.0767,.4001,90.30,.0926,.4353,88.90,.1257,.4831,
        86.60,.1315,.5455,85.00,.1674,.5585,83.20,.1818,.5775,82.30,.2083,.6273,81.60
14 DATA .2319,.6485,80.20,.2818,.6775,78.00,.2909,.6801,77.80,.3333,.6918,76.70,.3513,
        .7347,76.20,.4620,.7756,73.80,.5292,.7971,72.70,.5937,.8183,71.30
15 DATA 515,1,760.00,15,.02,.1340,96.40,.04,.2300,93.50,.06,.3040,91.20,.08,.3650,89.30,
        .10,.4180,87.70,.15,.5170,84.4,.20,.5790,81.70,.30,.6650,78.00
16 DATA .40,.7290,75.30,.50,.7790,73.10,.60,.8250,71.20,.70,.8700,69.30,.80,.9150,67.50,
        .90,.9580,66.00,.95,.9750,65.00
17 DATA 516,1,760.00,21,.0293,.1831,95.25,.0346,.2107,94.50,.0406,.2363,93.70,.0422,.2652,
        92.80,.0577,.2978,91.80,.0644,.3265,90.90,.0737,.3608,90.00,.0838,.3861,89.10,.0948,
        .4142,89.20,.2801,.6621,78.80,.3004,.6882,77.60,.3212,.6882,77.60
18 DATA .3435,.7002,76.90,.3664,.7178,76.20,.3909,.7274,75.70,.4141,.7428,75.10,.4391,
        .7597,74.60,.4637,.7668,74.00,.8457,.9360,67.20,.8867,.9632,66.60,.9293,.9771,65.70
19 DATA 517,1,760.00,14,.0321,.1900,95.35,.0372,.2220,94.00,.0523,.2940,92.50,.0595,.3080,
        91.50,.0750,.3520,89.90,.0876,.3900,88.10,.1540,.4900,85.10
20 DATA .1580,.5160,83.90,.1820,.5520,82.90,.2250,.5930,82.10,.2900,.6430,78.70,.3490,
        .7030,76.70,.8130,.9180,67.40,.9180,.9630,65.60
21 DATA 518,1,760.00,22,.00001,.00001,100.00,.0001,.0005,100.00,.00001,.0004,100.00,.0004,
        .0038,99.95,.0004,.0033,99.95,.0057,.0452,99.25,.0059,.0457,99.25,.0342,.2222,95.10,
        .0335,.2195,95.00,.0239,.2179,94.95,.0761,.3674,90.35,.0738,.3665,90.15
22 DATA .1165,.4855,86.50,.1207,.4694,86.45,.2646,.6184,79.15,.4092,.7305,75.20,.5810,
        .8079,71.80,.5816,.8313,71.80,.7218,.8542,69.10,.8808,.9417,66.50,.9657,.9569,64.95,
        .9871,.9778,64.70
23 DATA 519,1,2280.00,22,.0200,.1146,134.00,.0400,.2012,128.90,.0600,.2699,123.50,.0800,
        .3267,121.60,.1000,.3749,119.80,.1500,.4697,116.20,.2000,.5362,113.40,.2500,.5845,
        111.20,.3000,.6293,109.40,.3500,.6665,107.90,.4000,.6956,106.50
24 DATA .4500,.7240,105.20,.5000,.7405,104.10,.5500,.7717,103.00,.6000,.7974,102.00,.6500,
        .8229,101.00,.7000,.8184,100.10,.7500,.8738,99.30,.8000,.9016,98.50,.8500,.9257,
        97.70,.9000,.9513,97.00,.9500,.9766,96.40
25 DATA 520,1,3800.00,22,.0200,.1070,148.00,.0400,.1896,144.60,.0600,.2545,142.00,.0800,
        .3090,139.70,.1000,.3552,137.70,.1500,.4457,133.60,.2000,.5086,130.70,.2500,.5568,
        128.50,.3000,.5988,126.70,.3500,.6349,125.10,.4000,.6664,123.80
26 DATA .4500,.6975,122.50,.5000,.7280,123.10,.5500,.7552,120.20,.6000,.7848,119.10,.6500,
        .8125,118.10,.7000,.8407,117.10,.7500,.8663,116.10,.8000,.8948,115.20,.8500,.9206,
        114.30,.9000,.9486,113.50,.9500,.9747,112.80
27 DATA 521,1,6080,22,.0200,.1005,166.50,.0400,.1800,163.50,.0600,.2425,161.00,.0800,
        .2944,158.70,.1000,.3400,156.80,.1500,.4257,152.80,.2000,.4830,149.90,.2500,.5318,
        147.30,.3000,.5757,145.20,.3500,.6136,143.40,.4000,.6492,141.70
28 DATA .4500,.6800,140.20,.5000,.7135,138.80,.5500,.7436,137.50,.6000,.7734,136.30,.6500,
        .8021,136.00,.7000,.8309,134.10,.7500,.8595,133.20,.8000,.8864,132.30,.8500,.9162,
        131.50,.9000,.9434,130.60,.9500,.9728,129.80
29 DATA 522,1,8512.00,22,.0200,.0952,181.30,.0400,.1712,177.60,.0600,.2315,174.90,.0800,
        .2823,172.50,.1000,.3249,170.50,.1500,.4082,166.60,.2000,.4682,163.70,.2500,.5158,
        161.30,.3000,.5509,159.30,.3500,.6003,157.50,.4000,.6364,155.70
30 DATA .4500,.6692,154.10,.5000,.7030,152.50,.5500,.7354,151.00,.6000,.7638,149.70,.6500,
        .7930,148.50,.7000,.8211,147.30,.7500,.8505,146.20,.8000,.8808,145.20,.8500,.9104,
        144.40,.9000,.9405,143.60,.9500,.9700,143.00
31 DATA 523,2,39.76,21,.0478,.2559,68.10,.0925,.4562,85.60,.0925,.4628,86.30,.1335,.6214,
        97.60,.1523,.6164,103.40,.1809,.6486,109.80,.2032,.6734,118.40,.2027,.6796,119.10,
        .2228,.6954,122.40,.2557,.7263,132.00,.2866,.7383,138.20
32 DATA .3065,.7612,142.70,.3716,.8050,155.30,.4172,.8048,161.50,.4362,.8238,167.40,.5033,
        .8457,175.40,.5933,.8619,188.20,.6917,.8835,202.50,.6947,.8974,206.40,.8002,.9536,

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      223.10,.9270,.9761,244.30
33 DATA 524,2,49.76,12,.0486,.2741,119.50,.1218,.4741,157.00,.1478,.5220,169.70,.2131,
      .6294,196.00,.2693,.7106,217.00,.3252,.7580,236.60,.5143,.8203,283.00
34 DATA .6279,.8654,306.40,.7083,.9007,324.10,.8037,.9406,348.40,.9007,.9627,373.50,.9461,
      .9736,391.10
35 DATA 525,2,60.00,12,.0343,.2106,183.64,.0446,.2699,196.92,.0594,.3312,211.65,.0793,
      .3920,228.70,.1092,.4714,254.75,.1634,.5698,291.74
36 DATA .1961,.5989,309.50,.2705,.6699,353.18,.3670,.7462,395.79,.4619,.7889,431.10,.5665,
      .8223,466.95,.7582,.9010,538.25
37 DATA 526,2,100.00,12,.0022,.0192,780.52,.0110,.0860,827.64,.0350,.1910,931.00,.0530,
      .2450,1003.20,.1210,.4340,1235.76,.2810,.6190,1535.96
38 DATA .3520,.6620,1624.12,.5220,.7500,1882.52,.6670,.8240,2115.08,.8260,.9110,2337.76,
      .9320,.9690,2508.00,.9580,.9810,2528.52
39 DATA 527,2,140.00,6,.0960,.3440,3822.00,.2750,.5790,5100.00,.4440,.7020,5910.00,.5950,
      .7860,6620.00,.7910,.8800,7450.00,.9460,.9620,7940.00
41 DATA 528,2,150.00,11,.0090,.0600,3790.88,.0220,.1350,4085.76,.0440,.2130,4432.32,.0790,
      .2860,4856.40,.3740,.6100,7224.56,.4590,.6620,7683.60
42 DATA .7480,.8320,9173.20,.8930,.9290,10009.20,.9360,.9600,10161.20,.9530,.9720,
      10222.00,.9690,.9820,10298.00
43 DATA 529,2,200.00,11,.0049,.0320,12205.60,.0168,.0750,12669.20,.0590,.1960,14478.00,
      .0980,.2720,15511.60,.1720,.3890,17632.00,.2970,.5140,20170.40
44 DATA .5950,.7130,24616.40,.7200,.7960,26372.00,.9030,.9260,28857.20,.9350,.9450,
      29222.00,.9630,.9740,29579.20
81 DATA "CH3OH-1",8.07246,1574.990,238.860
82 'DATA "CH3OH-2",7.87863,1473.110,230.000
91 DATA "H2O-1",7.96681,1668.210,228.000
92 'DATA "H2O-2",8.10765,1750.286,235.00
99 'Rev.10-21-93
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10 DATA "C2H5OH","H2O",22: 'ETOHH2O.HIR
11 DATA 530,1,50.00,11,.0500,.2710,32.00,.1000,.4310,28.90,.2000,.5590,25.75,.3000,.6060,
      24.40,.4000,.6420,23.70,.5000,.6810,23.10,.6000,.7250,22.65
12 DATA .7000,.7760,22.20,.8000,.8390,21.90,.9000,.9082,21.65,.9500,.9529,21.60
13 DATA 531,1,100.00,11,.0500,.2840,44.90,.1000,.4390,41.55,.2000,.5600,38.25,.3000,
      .6040,37.10,.4000,.6410,36.45,.5000,.6770,35.90
14 DATA .6000,.7210,35.45,.7000,.7730,35.00,.8000,.8360,34.60,.9000,.9078,34.35,.9500,
      .9512,34.25
15 DATA 532,1,190.00,22,.0160,.1460,62.00,.0370,.2755,60.00,.0650,.3650,57.20,.0900,.4125,
      55.30,.1580,.5015,52.20,.2090,.5455,53.00,.2385,.5650,52.40,.3535,.6045,50.10,.4705,
      .6445,49.80,.4970,.6540,48.90,.5805,.6925,50.50
16 DATA .6525,.7260,48.50,.7000,.7550,49.80,.7200,.7685,48.70,.7895,.8152,50.20,.8416,
      .8502,49.10,.8735,.8790,49.00,.8970,.8990,49.80,.9485,.9466,49.50,.9600,.9580,47.60,
      .9719,.9700,50.30,.9812,.9798,48.60
17 DATA 533,1,250.00,11,.0500,.3070,63.90,.1000,.4490,59.95,.2000,.5540,56.70,.3000,.5990,
      55.15,.4000,.6340,54.40,.5000,.6790,54.00
18 DATA .6000,.7150,53.65,.7000,.7670,53.35,.8000,.8310,53.10,.9000,.9017,53.00,.9500,
      .9419,53.00
19 DATA 534,1,380.00,20,.0160,.1470,78.10,.0315,.2505,76.00,.0600,.3765,72.40,.0855,.4300,
      69.30,.1465,.5005,67.70,.2060,.5415,67.50,.2360,.5600,67.10
20 DATA .3495,.5945,65.30,.4675,.6410,64.70,.4875,.6425,64.30,.5800,.6890,64.40,.6525,
      .7250,64.20,.7000,.7495,63.80,.7175,.7680,63.20,.7890,.8111,63.80,.8420,.8488,62.70,
      .8749,.8768,62.50,.8967,.8973,63.60,.9485,.9440,63.50,.9727,.9692,63.00
21 DATA 535,1,500.00,11,.0500,.3180,79.60,.1000,.4530,75.70,.2000,.5430,72.55,.3000,.5850,
      71.05,.4000,.6210,70.25,.5000,.6580,69.60,.6000,.7060,69.05
22 DATA .7000,.7600,68.55,.8000,.8240,68.15,.9000,.9005,68.00,.9500,.9462,68.00
23 DATA 536,1,706.00,12,.0080,.0880,95.90,.0180,.1650,93.80,.0260,.2320,91.80,.0280,.2290,
      91.60,.0700,.3900,86.40,.0860,.4190,85.60,.1050,.4540,84.00
24 DATA .1200,.4710,83.40,.2910,.5720,79.90,.3610,.5970,79.40,.4070,.6180,78.80,.5610,
      .6820,77.70
25 DATA 537,1,740.00,11,.0500,.3240,89.75,.1000,.4390,85.25,.2000,.5340,82.10,.3000,.5770,
      80.70,.4000,.6130,79.75,.5000,.6520,78.90,.6000,.7000,78.25
26 DATA .7000,.7530,77.60,.8000,.8200,77.10,.9000,.8998,76.90,.9500,.9470,76.90
27 DATA 538,1,760.00,15,.0190,.1700,95.50,.0721,.3891,89.00,.0966,.4375,86.70,.1238,.4704,
      85.30,.1661,.5089,84.10,.2337,.5445,82.70,.2608,.5580,82.30
28 DATA .3273,.5826,81.50,.3965,.6122,80.70,.5079,.6564,79.80,.5198,.6599,79.70,.5732,
      .6841,79.30,.6763,.7385,78.74,.7472,.7815,78.41,.8943,.8943,78.15
29 DATA 539,1,760.00,18,.0210,.1990,94.30,.0330,.2720,91.90,.0500,.3530,90.00,.0850,.4110,
      87.30,.1050,.4580,86.10,.1250,.4880,85.20,.1350,.4840,84.70
30 DATA .3150,.5710,81.80,.3210,.5720,81.60,.4030,.6190,80.60,.4030,.6250,80.20,.5560,
      .6750,79.50,.6020,.6950,79.20,.6430,.7130,79.10,.6890,.7410,78.60,.8050,.8140,78.30,
      .9260,.9170,78.30,.9870,.9850,78.20
31 DATA 540,1,2585.50,18,.0076,.0710,135.50,.0238,.1950,131.10,.0392,.2650,128.70,.0590,
      .3210,126.10,.0675,.3380,125.40,.1010,.4110,122.50,.1200,.4330,121.30,.1350,.4540,
      120.40,.1840,.4920,119.40,.2630,.5360,117.10,.3240,.5660,116.30
32 DATA .4210,.6040,115.30,.4960,.6380,114.60,.5880,.6840,113.90,.6880,.7390,113.30,.8060,
      .8200,112.90,.8710,.8730,112.60,.9270,.9240,112.60
33 DATA 541,1,5171.80,18,.0075,.0570,162.10,.0141,.1090,160.40,.0275,.1850,157.00,.0412,
      .2550,154.00,.0635,.3140,151.40,.0807,.3560,149.50,.1030,.3860,147.80,.1380,.4260,
      146.80,.1710,.4560,144.80,.2530,.5070,142.70,.3150,.5400,141.50
34 DATA .4320,.5940,139.90,.5130,.6340,139.00,.5890,.6730,138.20,.6610,.7170,137.50,.7615,
      .7850,136.90,.8460,.8510,136.70,.9165,.9130,136.70
35 DATA 542,1,10343.00,18,.0215,.1420,188.00,.0300,.1820,186.10,.0495,.2480,182.70,.0573,
      .2590,182.20,.0845,.3230,178.90,.0930,.3410,177.80,.1450,.4030,174.90,.2055,.4490,
      172.60,.3220,.5180,169.80,.3500,.5310,169.30,.4160,.5660,168.00
36 DATA .4590,.5880,167.40,.5650,.6490,166.00,.6610,.7080,165.00,.7420,.7650,164.70,.8210,
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          .8270,164.30,.8800,.8780,164.20,.9370,.9320,164.30
37 DATA 543,1,15511.60,17,.0173,.1080,208.50,.0458,.2190,202.80,.0527,.2330,202.10,.0565,
          .2400,201.60,.0610,.2570,200.70,.0917,.3070,198.10,.1300,.3650,194.80,.1570,.3890,
          193.60,.2180,.4310,191.20,.3420,.5090,188.20,.4720,.5840,185.70
38 DATA .5360,.6210,184.90,.6050,.6710,183.90,.7215,.7470,183.10,.8110,.8180,182.60,.8800,
          .8780,182.60,.9320,.9280,182.70
39 DATA 544,2,50.00,9,.0460,.2900,133.00,.0930,.4240,157.00,.1225,.4820,164.00,.1580,
          .5070,177.00,.3330,.5900,200.00,.3425,.5860,196.00
40 DATA .5130,.6490,207.00,.8240,.8450,220.00,.9080,.9100,225.00
41 DATA 545,2,50.00,6,.0956,.4796,154.50,.1600,.5384,173.30,.2500,.5749,187.00
42 DATA .3366,.5934,193.30,.4870,.6509,202.80,.7455,.7859,216.30
43 DATA 546,2,60.00,8,.3750,.5960,325.00,.5090,.6480,342.00,.5270,.6600,344.00
44 DATA .5450,.6710,343.00,.8080,.8260,363.00,.8510,.8620,364.00,.8600,.8670,366.00,.9720,
          .9720,362.00
45 DATA 547,2,150.00,5,.0730,.3340,5533.60,.1380,.4140,6153.70,.2650,.4870,6723.00,.5140,
          .6160,7498.90,.6390,.6950,7600.00
47 DATA 548,2,150.00,17,.0180,.1590,4488.90,.0480,.2880,4706.10,.0840,.3670,5274.90,.1550,
          .4380,5843.80,.1840,.4580,6050.10,.2320,.4900,6205.80,.2640,.5030,6309.20,.3260,
          .5280,6309.20,.3400,.5350,6360.90,.4630,.6000,6723.00
48 DATA .5720,.6580,6878.10,.6480,.7040,6981.50,.7170,.7490,6981.50,.7810,.7970,7188.40,
          .8620,.8620,7395.30,.9230,.9190,7395.30,.9660,.9610,7395.30
49 DATA 549,2,200.00,5,.0580,.2470,15511.60,.1140,.3380,17115.20,.2370,.4330,19136.80,
          .4970,.5850,21462.40,.6330,.6810,21926.00
51 DATA 550,2,200.00,17,.0230,.1340,13445.90,.0320,.1750,14014.70,.0480,.2190,14893.90,
          .0660,.2620,15514.50,.0880,.2990,16186.80,.1120,.3370,17014.20,.1570,.3810,
          17531.40,.2140,.4240,18565.70,.2950,.4660,18824.30,.3450,.4950,19910.30
52 DATA .3910,.5280,19703.40,.4790,.5790,21048.00,.4910,.5860,20427.40,.5800,.6410,
          21306.60,.6890,.7190,21823.70,.8240,.8280,22599.50,.9340,.9290,22134.00
53 DATA 551,2,250.00,18,.0090,.0440,30615.30,.0340,.1350,34390.50,.0630,.2060,37131.40,
          .0980,.2640,39510.30,.1350,.3040,41113.40,.1720,.3400,42768.30,.2230,.3760,
          44371.50,.2850,.4170,46129.80,.3390,.4460,47060.70,.4020,.4870,48612.10
54 DATA .4630,.5300,49905.00,.5650,.6050,51870.10,.6730,.6900,53370.00,.7020,.7150,
          53680.20,.7050,.7150,53628.50,.7370,.7400,53783.60,.7560,.7560,53783.60,.7900,
          .7900,53783.60
81 DATA "C2H5OH",8.04494,1554.300,222.650
91 'DATA "H2O-1",7.96681,1668.210,228.000
92 DATA "H2O-2",8.10765,1750.286,235.00
99 'Rev.10-21-93
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10 DATA "iC3H7OH","H2O",9: 'IPROHH2O.HIR
11 DATA 557,1,95.00,22,.0055,.0600,49.17,.0140,.1655,47.10,.0345,.3105,43.44,.0510,.4055,
      41.19,.0795,.4820,39.01,.1395,.5165,37.85,.1850,.5285,37.53,.2610,.5457,37.14,.3875,
      .5705,36.87,.5080,.6030,36.14,.5725,.6250,36.17,.6495,.6565,36.23
12 DATA .6505,.6565,36.38,.6580,.6605,36.21,.6960,.6740,36.01,.7350,.7040,36.07,.7385,
      .7055,35.78,.7400,.7070,36.23,.7715,.7275,36.33,.8195,.7665,36.39,.8940,.8300,37.04,
      .9425,.9040,37.65
13 DATA 558,1,190.00,22,.0075,.0985,62.86,.0175,.1915,60.41,.0300,.2940,57.66,.0485,.4045,
      54.70,.0840,.4840,51.99,.1500,.5210,51.12,.1625,.5255,50.81,.2115,.5385,50.47,.2725,
      .5510,50.41,.3860,.5725,49.97,.4765,.5955,49.57,.5710,.6270,49.32
14 DATA .5890,.6340,49.34,.6645,.6670,49.33,.6860,.6790,49.35,.7075,.6910,49.23,.7530,
      .7200,49.39,.7580,.7235,49.40,.7940,.7500,49.55,.8545,.8035,49.86,.8870,.8390,50.00,
      .9520,.9230,50.62
15 DATA 559,1,380.00,23,.0065,.0925,79.20,.0410,.3905,70.12,.0605,.4565,67.76,.0770,.5100,
      66.25,.1305,.5255,65.59,.1765,.5355,65.31,.2620,.5465,65.02,.2680,.5490,64.98,.3350,
      .5625,64.61,.3915,.5700,64.60,.4765,.5960,64.19,.5865,.6335,63.95
16 DATA .6585,.6635,63.90,.6715,.6740,63.93,.6930,.6875,63.91,.7450,.7200,63.96,.7565,
      .7280,63.96,.7980,.7600,63.99,.8590,.8100,64.24,.8760,.8330,64.51,.8865,.8435,64.56,
      .8935,.8510,64.64,.9285,.8935,64.90
17 DATA 560,1,760.00,10,.0100,.1900,95.00,.0200,.3400,90.00,.0300,.4300,86.70,.0600,.5050,
      83.50,.1500,.5600,81.50,.3000,.5800,81.00,.5000,.6300,80.70
18 DATA .7000,.7000,80.50,.8000,.7700,81.00,.9000,.8300,82.30
19 DATA 561,1,760.00,27,.0016,.0364,98.87,.0083,.1473,95.30,.0136,.2244,93.19,.0204,.2308,
      90.80,.0254,.3399,89.04,.0488,.4660,83.80,.0843,.5024,82.63,.1232,.5378,81.41,.1629,
      .5298,81.39,.1986,.5444,81.19,.2387,.5559,81.11,.3314,.5654,80.77
20 DATA .4597,.5939,80.44,.5838,.6358,80.14,.6496,.6659,80.04,.6813,.6813,80.16,.6838,
      .6846,80.05,.6857,.6824,80.04,.6905,.6879,80.03,.6971,.6931,80.05
21 DATA .7333,.7142,80.07,.7702,.7401,80.14,.8100,.7698,80.30,.8520,.8126,80.51,.8872,
      .8500,80.75,.9153,.8801,80.01,.9319,.9011,80.21
22 DATA 562,1,760.00,27,.0020,.0360,98.90,.0080,.1470,95.30,.0140,.2240,93.20,.0200,.2310,
      90.80,.0250,.3400,89.00,.0490,.4660,83.80,.0840,.5020,82.60,.1230,.5380,81.40,.1630,
      .5300,81.40,.1990,.5440,81.20,.2390,.5560,81.10,.3310,.5650,80.80
23 DATA .4600,.5940,80.40,.5840,.6360,80.10,.6500,.6660,80.00,.6810,.6810,80.20,.6840,
      .6850,80.10,.6860,.6820,80.00,.6910,.6880,80.00,.6970,.6930,80.10
24 DATA .7330,.7140,80.10,.7700,.7400,80.10,.8100,.7700,80.30,.8520,.8130,80.50,.8870,
      .8500,80.80,.9150,.8800,81.00,.9320,.9010,81.20
25 DATA 563,1,760.00,24,.0115,.1630,95.17,.0160,.2115,93.40,.0365,.3655,88.05,.0570,.4565,
      84.57,.1000,.5015,82.70,.1215,.5120,82.32,.1665,.5215,81.99,.1895,.5375,81.58,.1935,
      .5320,81.75,.2450,.5390,81.62,.2835,.5530,81.23,.2975,.5540,81.29
26 DATA .2980,.5510,81.28,.3835,.5700,80.90,.4460,.5920,80.67,.5145,.6075,80.38,.5590,
      .6255,80.31,.6460,.6645,80.15,.6605,.6715,80.16,.6955,.6915,80.11,.7650,.7370,80.23,
      .8090,.7745,80.37,.8725,.8340,80.70,.9535,.9325,81.48
27 DATA 564,1,760.00,22,.0050,.0600,97.60,.0080,.1600,95.00,.0160,.2850,91.30,.0250,.3250,
      89.80,.0320,.3650,88.20,.0650,.4350,84.90,.1100,.4900,83.00,.2350,.5460,81.60,.3400,
      .5700,81.10,.4200,.5900,80.70,.5500,.6250,80.30
28 DATA .5600,.6350,80.20,.5900,.6500,80.10,.7200,.7000,80.00,.7500,.7300,80.00,.7800,
      .7500,80.10,.8300,.7900,80.20,.8700,.8200,80.40,.9000,.8500,80.60,.9450,.9000,81.00,
      .9600,.9200,81.20,.9900,.9650,81.70
29 DATA 565,2,150.00,19,.0040,.0940,3878.60,.0100,.1510,4137.20,.0140,.2330,4550.90,.0260,
      .3150,5068.10,.0500,.3820,5792.10,.1040,.4350,6050.70,.1640,.4610,6205.80,.2530,
      .5010,6412.70,.2670,.4900,6412.70,.3780,.5270,6567.80
30 DATA .4950,.5740,6774.70,.5700,.6110,6826.40,.5880,.6210,6826.40,.6610,.6670,6826.40,
      .7100,.6990,6878.10,.7450,.7260,6826.40,.8180,.7880,6774.70,.9050,.8800,6619.50,
      .9410,.9230,6464.40
81 DATA "iPrOH-1",6.66040,813.055,132.930
82 'DATA "iPrOH-2",7.75634,1366.142,197.970
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91 DATA "H2O-1",7.96681,1668.210,228.000
92 'DATA "H2O-2",8.10765,1750.286,235.00
99 'Rev. 10-23-93
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10 DATA "C3H6O","H2O",13: 'ACETH2O.HIR
11 DATA 492,1,200.00,12,.0100,.2270,57.50,.0300,.4850,49.00,.0600,.7180,43.00,.1000,.7820,
    36.50,.2000,.8430,30.10,.3000,.8630,27.60,.4000,.8720,26.40
12 DATA .5000,.8790,25.60,.6000,.8850,24.80,.7000,.8950,24.30,.8000,.9150,23.60,.9000,
    .9470,22.70
13 DATA 493,1,350.00,12,.0100,.2950,73.40,.0300,.5700,63.30,.0600,.7040,55.20,.1000,.7730,
    49.20,.2000,.8340,43.30,.3000,.8540,41.00,.4000,.8620,39.80
14 DATA .5000,.8680,39.00,.6000,.8750,38.40,.7000,.8870,37.70,.8000,.9100,36.90,.9000,
    .9440,36.20
15 DATA 494,1,500.00,12,.0100,.3250,79.00,.0300,.5300,70.50,.0600,.6940,63.80,.1000,.7660,
    57.50,.2000,.8260,52.20,.3000,.8460,50.50,.4000,.8540,49.40
16 DATA .5000,.8600,48.70,.6000,.8660,48.00,.7000,.8820,47.20,.8000,.9050,46.40,.9000,
    .9410,45.50
17 DATA 495,1,760.00,19,.0500,.6381,74.80,.1000,.7301,68.53,.1500,.7716,65.26,.2000,.7916,
    63.59,.2500,.8034,62.60,.3000,.8124,61.87,.3500,.8201,61.26,.4000,.8269,60.75,.4500,
    .8326,60.35,.5000,.8387,59.95,.5500,.8455,59.54
18 DATA .6000,.8532,59.12,.6500,.8615,58.71,.7000,.8712,58.29,.7500,.8817,57.90,.8000,
    .8950,57.49,.8500,.9118,57.08,.9000,.9335,56.68,.9500,.9627,56.30
19 DATA 496,1,760.00,13,.0080,.1380,95.10,.0160,.2770,90.10,.0330,.4790,82.10,.0520,.6040,
    76.20,.0720,.6750,72.20,.0940,.7190,69.50,.1170,.7380,67.60
20 DATA .1720,.7760,65.00,.2370,.8000,63.30,.3180,.8220,62.00,.4200,.8390,61.00,.5540,
    .8630,59.90,.7360,.9090,58.20
21 DATA 497,1,760.00,13,.0100,.3350,87.80,.0230,.4620,83.00,.0410,.5850,76.50,.1200,.7560,
    66.20,.2640,.8020,61.80,.3000,.8090,61.10,.4440,.8320,60.00
22 DATA .5060,.8370,59.70,.5380,.8400,59.50,.6090,.8470,58.90,.6610,.8600,58.50,.7930,
    .9000,57.40,.8500,.9170,57.10
23 DATA 498,1,2585.50,12,.0170,.3490,122.50,.0240,.3980,120.00,.0550,.5180,112.00,.1070,
    .6080,106.00,.1940,.6700,102.80,.2730,.69950,101.30,.3880,.7180,99.90
24 DATA .5450,.7470,99.00,.6330,.7680,98.80,.7780,.8300,98.60,.8900,.9030,98.40,.9500,
    .9510,98.20
25 DATA 499,1,5171.80,11,.0140,.2490,150.70,.0360,.3950,142.30,.0780,.5070,136.40,.1440,
    .5820,131.10,.2290,.6180,129.60,.3410,.6500,129.00,.4440,.6650,128.30
26 DATA .5590,.7000,126.60,.7540,.7810,125.70,.8420,.8450,125.40,.9250,.91200,126.00
27 DATA 500,1,10343.6,13,.0200,.2890,177.20,.00620,.3970,168.90,.1080,.4770,164.40,.1360,
    .4950,163.90,.1750,.5260,162.50,.2440,.5610,160.60,.3720,.5930,159.90
28 DATA .3820,.5950,159.10,.4890,.6320,158.40,.5900,.6690,157.90,.6410,.6990,157.80,.7520,
    .7580,157.60,.8630,.8500,157.20
29 DATA 501,1,12927.60,12,.0160,.2060,193.40,.0440,.3350,185.10,.0870,.4230,178.60,.1760,
    .5050,174.00,.2740,.5510,172.20,.3910,.5800,170.60,.4940,.6120,170.30
30 DATA .6080,.6660,168.80,.7220,.7310,168.40,.8090,.7840,168.60,.9030,.8840,169.70,.9470,
    .9310,170.40
31 DATA 502,1,25855.20,10,.0230,.1400,230.00,.0920,.3180,218.90,.1850,.4080,212.70,.2910,
    .4650,210.60,.4120,.5270,208.60,.5470,.5850,207.50,.6690,.6630,206.00
32 DATA .7890,.7500,208.50,.8840,.8530,209.20,.9390,.9210,211.10
33 DATA 503,2,25.00,13,.0194,.5234,50.10,.0289,.6212,61.80,.0449,.7168,81.30,.0556,.7591,
    91.90,.0939,.8351,126.10,.0951,.8416,126.60,.1310,.8618,144.30
34 DATA .1470,.8768,150.60,.1791,.8782,159.80,.2654,.8856,176.10,.3538,.8954,184.40,.5808,
    .9158,199.10,.7852,.9421,213.50
35 DATA 504,2,150.00,14,.0240,.2950,5041.80,.1630,.5250,7030.40,.3490,.5880,8276.40,.4300,
    .6160,8458.80,.5780,.6770,8762.80,.6860,.7310,8914.80
36 DATA .7220,.7500,8960.40,.7630,.7770,9013.60,.8180,.8210,9006.00,.8540,.8450,8990.80,
    .8870,.8770,8222.40,.9120,.9020,8861.60,.9600,.9570,8709.60,.9700,.9680,8671.60
81 DATA "C3H6O",7.02447,1161.000,224.000
91 DATA "H2O-1",7.96681,1668.210,228.000
92 'DATA "H2O-2",8.10765,1750.286,235.00
99 'Rev.10-21-93

```
10 DATA "MeCOEt","H2O",6: 'MEKH2O.HIR
11 DATA 505,1,350.00,4,.0300,.6720,56.60,.0500,.6960,53.00,.8000,.7330,52.90,.9000,.8110,
       53.90
13 DATA 506,1,500.00,5,.0300,.6400,66.70,.0500,.6770,62.30,.7000,.6830,62.10,.8000,.7210,
       62.20,.9000,.8040,63.30
15 DATA 507,1,760.00,5,.0300,.6110,77.00,.0500,.6450,73.40,.7000,.6620,73.30,.8000,.6950,
       73.60,.9000,.7840,75.20
17 DATA 508,1,5171.80,13,.0010,.0890,162.60,.0060,.2640,155.10,.0120,.3630,149.20,.0300,
       .4590,142.90,.0460,.4690,141.90,.3310,.5040,139.30,.4650,.5100,139.20
18 DATA .5370,.5070,139.00,.6000,.5330,139.30,.7220,.5960,140.30,.8260,.6670,142.40,.9000,
       .7710,147.40,.9880,.9370,152.20
19 DATA 509,1,12927.60,11,.0040,.0890,200.20,.0360,.3320,185.60,.1120,.4220,182.40,.3180,
       .4380,181.10,.3730,.4390,180.70,.4860,.4620,180.70,.5990,.5080,181.60
20 DATA .7290,.5860,184.80,.8480,.7100,189.80,.8980,.7930,193.40,.9890,.9780,201.60
21 DATA 510,1,25855.20,12,.0110,.1000,233.90,.0860,.2840,221.10,.1810,.3520,218.00,.2700,
       .3660,216.80,.3650,.3900,216.50,.4100,.4060,216.10,.5360,.4610,217.20
22 DATA .6190,.5020,219.40,.7030,.5740,223.40,.8320,.7380,231.10,.9090,.8630,239.40,.9450,
       .9010,242.20
81 DATA "MeCOEt",6.97421,1209.600,216.000
91 DATA "H2O-1",7.96681,1668.210,228.000
92 'DATA "H2O-2",8.10765,1750.286,235.00
```

SYSTEM:(1):CH3OH-(2):H2O

1	GO 47	ISOBAR	@ 760	17	pts
2	GO 52	ISOBAR	@ 760	14	pts
3	GO 71	ISOBAR	@ 760	21	pts
4	GO 66	ISOBAR	@ 200	11	pts
5	GO 67	ISOBAR	@ 390	11	pts
6	GO 68	ISOBAR	@ 500	11	pts
7	GO 69	ISOBAR	@ 760	11	pts
8	GO 74	ISOBAR	@ 760	13	pts
9	GO 48	ISOBAR	@ 760	12	pts
10	GO 65	ISOBAR	@ 760	12	pts
11	GO 64	ISOBAR	@ 350	12	pts
12	GO 58	ISOBAR	@ 760	34	pts
13	GO 60	ISOBAR	@ 760	27	pts
14	GO 76	ISOBAR	@ 760	13	pts
15	GO 72	ISOTHERM	@ 39.9	10	pts
16	GO 53	ISOBAR	@ 760	15	pts
17	GO 41	ISOTHERM	@ 60	12	pts
18	GO 54	ISOBAR	@ 760	16	pts
19	GO 75	ISOBAR	@ 760	14	pts
20	GOa53	ISOBAR	@ 760	21	pts
21	GOa55	ISOBAR	@ 760	16	pts
22	GOa58	ISOBAR	@ 760	12	pts
23	GOb29	ISOTHERM	@ 24.99	14	pts

ANTOINE	CH3OH-1	8.08097	1582.271	239.726
	H2O-1	8.07131	1730.63	233.426

GO 47   A12= 84.93633 A21= 459.158 W12= .3843708 W21= 1.038016
%ad:Y1= .9014315 ad:T = .2646718 %BESE(Y)= 1.205932

GO 52   A12=-17.41786 A21= 513.4224 W12= .4568969 W21= .9471219
%ad:Y1= 1.306557 ad:T = .4792154 %BESE(Y)= 1.656488

GO 71   A12= 23.32969 A21= 439.2876 W12= .4265142 W21= 1.073439
%ad:Y1= .788246 ad:T = .390633 %BESE(Y)= 1.027134

GO 66   A12=-371.5153 A21= 704.366 W12= .8308405 W21= .6860653
%ad:Y1= 1.618849 ad:T = .4164977 %BESE(Y)= 2.419513

GO 67   A12= 257.6047 A21= 687.7595 W12= .287153 W21= .7055778
%ad:Y1= 5.590438 ad:T = 1.917719 %BESE(Y)= 7.324097

GO 68   A12=-27.52816 A21= 512.5792 W12= .4647648 W21= .9484716
%ad:Y1= .5658378 ad:T = .22283 %BESE(Y)= .689573

GO 69   A12=-76.61711 A21= 566.3202 W12= .5049352 W21= .8661835
%ad:Y1= .8973211 ad:T = .2748101 %BESE(Y)= 1.078319

GO 74   A12= 124.2945 A21= 379.6531 W12= .3596538 W21= 1.187173
%ad:Y1= .2503244 ad:T = .1395422 %BESE(Y)= .3456095

GO 48   A12=-271.4844 A21= 633.451 W12= .7017038 W21= .7733488
%ad:Y1= 1.23453 ad:T = .5254085 %BESE(Y)= 1.863804

GO 65   A12= 363.6963 A21= 274.8955 W12= .2400514 W21= 1.416917
%ad:Y1= .8391102 ad:T = .4333795 %BESE(Y)= 1.231835

GO 64   A12= 83.39461 A21= 333.7743 W12= .3853728 W21= 1.282809
%ad:Y1= 1.194405 ad:T = .5850156 %BESE(Y)= 1.641722

GO 58   A12= 165.5024 A21= 391.8822 W12= .3354766 W21= 1.162907
%ad:Y1= .7062345 ad:T = .1893829 %BESE(Y)= .9992714

GO 60   A12= 238.7803 A21= 361.2146 W12= .2964281 W21= 1.22472
%ad:Y1= 1.220348 ad:T = .2910767 %BESE(Y)= 1.716101

GO 76   A12=-22.65841 A21= 500.1514 W12= .4609584 W21= .9685878
%ad:Y1= .6441795 ad:T = .1419989 %BESE(Y)= .7275789

GO 72   A12= 46.18105 A21= 408.5853 W12= .4103685 W21= 1.130563
%ad:Y1= .2454293 ad:T = 9.086609E-03 %BESE(Y)= .3229808

GO 53   A12= 185.1248 A21= 349.2731 W12= .324542 W21= 1.249669
%ad:Y1= 1.174284 ad:T = .4546534 %BESE(Y)= 1.615447

```
GO 41        A12= 30.39252  A21= 420.1948  W12= .4214572  W21= 1.108614
             %ad:Y1= .7728176  ad:T = 8.329391E-03  %BESE(Y)= .9362319
GO 54        A12=-49.11071  A21= 520.0795  W12= .4820168  W21= .9365338
             %ad:Y1= .8409046  ad:T = .2811747  %BESE(Y)= 1.09041
GO 75        A12= 183.693  A21= 321.095  W12= .3253276  W21= 1.310573
             %ad:Y1= 1.687126  ad:T = .7338807  %BESE(Y)= 2.185732
GOa53        A12= 131.722  A21= 406.6879  W12= .3551707  W21= 1.134191
             %ad:Y1= .2362257  ad:T = .1392401  %BESE(Y)= .3148641
GOa55        A12= 291.9329  A21= 376.1055  W12= .2709796  W21= 1.194307
             %ad:Y1= 1.483383  ad:T = .5050397  %BESE(Y)= 2.546101
GOa58        A12= 322.6072  A21= 341.8801  W12= .2572999  W21= 1.265369
             %ad:Y1= 1.355108  ad:T = .4001675  %BESE(Y)= 2.118015
GOb29        A12=-43.517  A21= 422.3419  W12= .4774849  W21= 1.104601
             %ad:Y1= .3386623  ad:T = 8.442879E-03  %BESE(Y)= .6882631
```
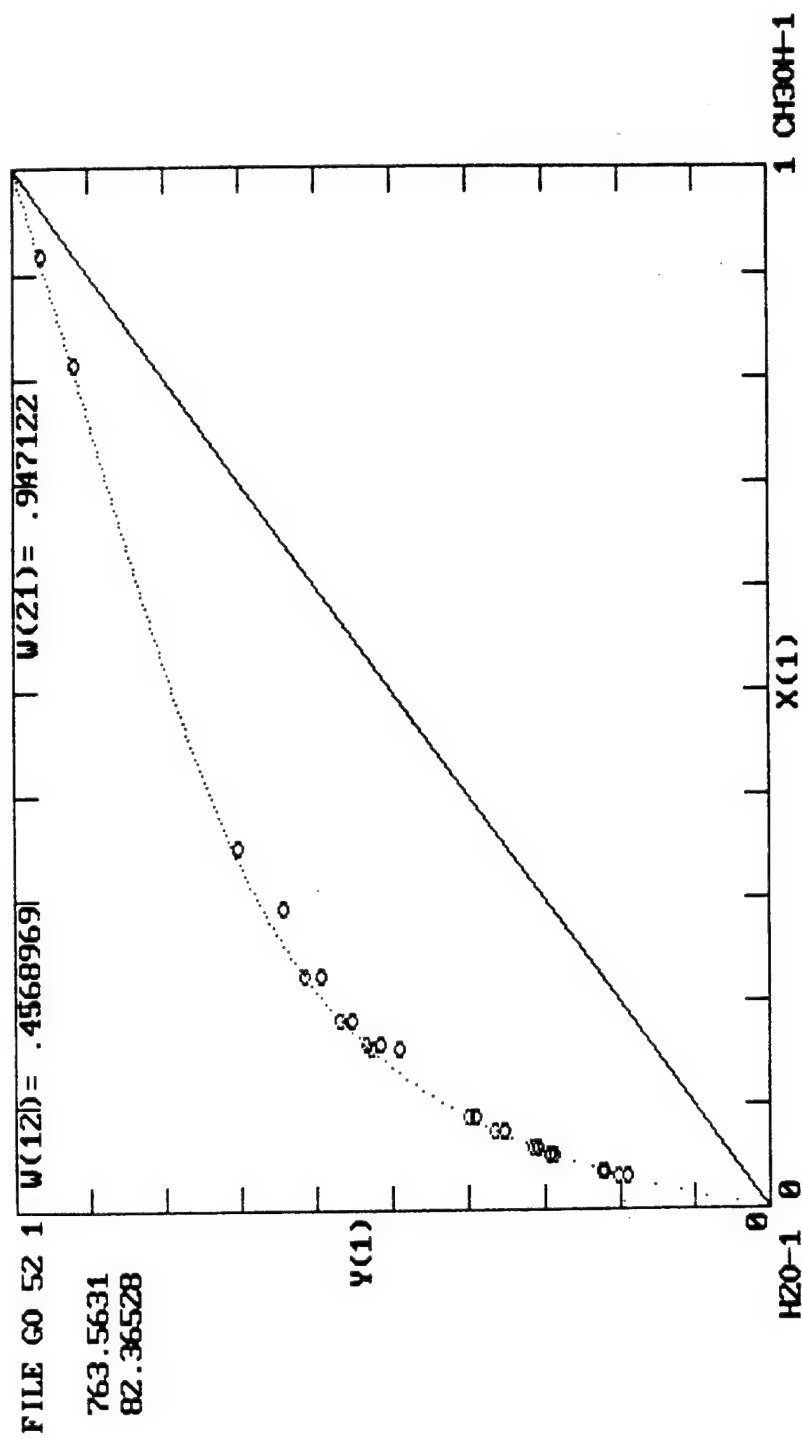
<W12>= .4112942   <W21>= 1.074598

```
100 'LIQVAPLP.BAS,A 7-25-95 Copyright 1995 by P. E. Field, IO ASSO./VTECHEM
105 SCREEN 9: KEY OFF: CLS: READ C1$,C2$,F: GOSUB 700
110 DIM X(NM,2),Y(NM,2),PT(NM,2),D(NM,2),QC(NM),QD(NM),QE(NM),LP(NM,2),R(NM)
115 SG1=0: SG2=0: FOR NF=1 TO F: RESTORE: READ X$,X$,X: GOSUB 760
120 FOR J=1 TO N: READ X(J,1),Y(J,1),D: IF C3=1 THEN PT(J,2)=D ELSE PT(J,1)=D
130 IF C3=1 THEN PT(J,1)=C4 ELSE PT(J,2)=C4
135 'PRINT "#";J: WHILE INKEY$="": WEND: NEXT J
140 X(J,2)=1-X(J,1): Y(J,2)=1-Y(J,1): NEXT J
150 PRINT C$(1);"/";C$(2);,"X(1)","Y(1)","P1+P2","T"
155 FOR J=1 TO N: PRINT ,X(J,1),Y(J,1),PT(J,1),PT(J,2): NEXT J
160 FOR K=1 TO N
170 LP(K,1)=LOG(10)*(AP(1,1)-AP(2,1)/(PT(K,2)+AP(3,1)))-LOG(PT(K,1))
180 LP(K,2)=LOG(10)*(AP(1,2)-AP(2,2)/(PT(K,2)+AP(3,2)))-LOG(PT(K,1))
190 NEXT K: G1=.5: G2=.5
200 A=0: B=0: C=0: S=0: T=0: SQ=0: FOR K=1 TO N
210 QC(K)=X(K,1)*LOG(X(K,1)+G1*X(K,2))+X(K,2)*LOG(X(K,1)*G2+X(K,2))
220 QD(K)=X(K,1)*(LOG(Y(K,1)/X(K,1))-LP(K,1))
225 QE(K)=X(K,2)*(LOG(Y(K,2)/X(K,2))-LP(K,2))
230 R(K)=QE(K)+QD(K)+QC(K): SQ=SQ+R(K)*R(K)
240 D(K,1)=X(K,1)*X(K,2)/(X(K,1)+G1*X(K,2))
250 D(K,2)=X(K,1)*X(K,2)/(X(K,2)+G2*X(K,1))
255 'PRINT QC(K),QE(K),R(K),D(K,1),D(K,2)
260 A=A+D(K,1)*D(K,1): B=B+D(K,1)*D(K,2): C=C+D(K,2)*D(K,2)
270 S=S+D(K,1)*R(K): T=T+D(K,2)*R(K): NEXT K
280 V=(A*T-B*S)/(A*C-B*B): U=(S-B*V)/A: E=ABS(U)+ABS(V)
290 G1=G1-U: G2=G2-V: IF G1>0 AND G2>0 THEN GOTO 295
292 G1=G1+U: G2=G2+V: U=U*.5: V=V*.5: GOTO 290
295 IF E>.00001 THEN GOTO 200
300 'LOCATE 24,29: PRINT "PRESS ANY KEY FOR PLOT";: WHILE INKEY$="": WEND
310 CLS: PRINT "FILE ";C$,"W(12)=";G1,"W(21)=";G2
320 LINE (100,0)-(100,320): LINE -(540,320): LINE -(540,0): LINE -(100,0)
330 FOR J=1 TO N: CIRCLE (100+440*X(J,1),320-320*Y(J,1)),3: NEXT J
340 LINE (100,320)-(540,0): GOSUB 600
345 T=PT(1,2): IF C3=1 THEN T=1.05*T
350 FOR X=1/176 TO 1 STEP 1/176: Z=1-X
360 GOSUB 500: Y1=PA/PC
370 PSET (100+440*X,320-320*Y1): NEXT X
375 T=PT(1,2): IF C3=1 THEN T=1.05*T
380 SS=0: SY=0: ST=0: FOR K=1 TO N: X=X(K,1): Z=1-X
385 IF C3=2 THEN T=PT(1,2)
390 GOSUB 500: Y1=PA/PC: SS=SS+(Y1-Y(K,1))^2
395 SY=SY+ABS(Y1-Y(K,1)): ST=ST+ABS(T-PT(K,2))
400 CIRCLE (100+440*X,320-320*Y1),3,2: 'LOCATE 3,1: PRINT PC;: NEXT K
410 LOCATE 3,1: PRINT PC: PRINT T: NEXT K: 'WHILE INKEY$="": WEND: NEXT K
460 LOCATE 3,1: PRINT "Avg. Dev. of Y1=";SY/N
470 PRINT "Avg. Dev. of T =";ST/N
480 PRINT "BESE(Y)=";SQR(SS/N): PRINT "Least Squares (SQ)=";SQ
490 CLS: GOSUB 800: NEXT NF: LPRINT: LPRINT "<W12>=";SG1/F,"<W21>=";SG2/F
495 LPRINT CHR$(12): END
500 M=0: SP=-.1
510 GA=EXP(-LOG(X+G1*Z)+Z*(G1/(X+G1*Z)-(G2/(G2*X+Z))))
520 GB=EXP(-LOG(Z+G2*X)-X*(G1/(X+G1*Z)-(G2/(G2*X+Z))))
530 P1=EXP(LOG(10)*(AP(1,1)-AP(2,1)/(T+AP(3,1))))
540 P2=EXP(LOG(10)*(AP(1,2)-AP(2,2)/(T+AP(3,2))))
550 PA=GA*P1*X: PB=GB*P2*Z: PC=PA+PB
560 IF PO=PC THEN RETURN
```

```
565 IF (PC>.995*PT(N,1) AND PC<1.005*PT(N,1)+1) THEN RETURN
570 IF INT(PC+.5)>PT(N,1) THEN 590
580 IF INT(PC+.5)<PT(N,1) THEN SP=-SP/10
590 T=T+SP: PO=PC: GOTO 530
600 LOCATE 1,12: PRINT "1": LOCATE 11,9: PRINT "Y(1)";: LOCATE 23,12
610 PRINT "0";: LOCATE 24,1: PRINT TAB(12-LEN(C$(2)));C$(2);" 0";
620 LOCATE 24,40: PRINT "X(1)";TAB(68);
630 PRINT "1  ";C$(1);: LOCATE 1,1
640 FOR Y=0 TO 320 STEP 32: LINE (100,Y)-(110,Y): LINE (530,Y)-(540,Y): NEXT Y
650 FOR X=100 TO 540 STEP 44: LINE (X,320)-(X,310): LINE (X,0)-(X,10): NEXT X
660 RETURN
700 PRINT "SYSTEM:(1):";C1$;"-(2):";C2$: PRINT "FILE NUMBER","FILE NAME",,,"# DATA"
705 LPRINT "SYSTEM:(1):";C1$;"-(2):";C2$
710 FOR I=1 TO F: READ NF$,C3,C4,N: IF C3=1 THEN C3$="ISOBAR" ELSE
C3$="ISOTHERM"
715 IF N>=NM THEN NM=N: 'IF I=20 THEN WHILE INKEY$="": WEND
720 PRINT I,NF$,C3$,"@";C4,N
725 LPRINT I,NF$,C3$,"@";C4,N;" pts"
730 FOR J=1 TO N: READ X,X,X: NEXT J: NEXT I: DIM AP(3,2)
740 LPRINT: LPRINT "ANTOINE";: FOR J=1 TO 2: READ C$(J): LPRINT ,;C$(J),;
745 FOR K=1 TO 3: READ AP(K,J): LPRINT AP(K,J),,;: NEXT K: NEXT J: LPRINT
750 RETURN: 'RESTORE: LOCATE 24,10: INPUT "ENTER FILE NUMBER";NF: READ X$,X$,X
760 FOR I=1 TO NF: READ C$,C3,C4,N: IF I<NF THEN GOTO 780
770 NEXT I: RETURN
780 FOR J=1 TO N: READ X,X,X: NEXT J: GOTO 770
800 V1=40.73: V2=18.07: R=1.9871: T=298
805 LPRINT C$;
810 A12=-R*T*LOG(G1*(V1/V2))
815 W12=(V2/V1)*EXP(-A12/(R*T))
820 A21=-R*T*LOG(G2*(V2/V1))
825 W21=(V1/V2)*EXP(-A21/(R*T))
830 LPRINT ,;" A12=";A12;" A21=";A21;
835 LPRINT " W12=";W12;" W21=";W21
840 LPRINT ,;" %ad:Y1=";100*SY/N;
845 LPRINT " ad:T =";ST/N;
850 LPRINT " %BESE(Y)=";100*SQR(SS/N)
855 SG1=SG1+G1: SG2=SG2+G2
860 RETURN
900 V1=40.73: V2=18.07: R=1.98721: INPUT "T,C";T: T=273.2+T
910 INPUT "A12";A12
915 W12=(V2/V1)*EXP(-A12/(R*T))
920 INPUT "A21";A21
925 W21=(V1/V2)*EXP(-A21/(R*T))
930 PRINT "A12=";A12;" W12=";W12
935 PRINT "A21=";A21;" W21=";W21
940 END
999 PRINT ERL,ERR,K: RESUME
1000 READ A$,B$,M
1010 READ A$,A,B,N: PRINT A$,A,B,N
1020 FOR I=1 TO N: READ X,Y,Z: PRINT I,Z,X,Y: NEXT I
1030 J=J+1: PRINT "#";J: WHILE INKEY$="": WEND: GOTO 110
1035 PRINT "#";J: WHILE INKEY$="": WEND: NEXT J
1040 LPRINT: LPRINT A$: FOR J=1 TO M: FOR I=J+1 TO M
1050 IF A$(I)>A$(J) THEN GOTO 170
1060 D$=A$(I): A$(I)=A$(J): A$(J)=D$
1070 NEXT I: LPRINT A$(J),,;: NEXT J
```

FILE G0 52 1 │W(12l)= .4568969│ │W(21)= .947122│

763.5631
82.36528

X(1)

Y(1)

0 ────── 0

H2O-1 ────── 1 CH3OH-1

BLANK

APPENDIX C
PROGRAM LVSEARCH.BAS

CH3OH-H2O	# files: 23				
FILE	W(12)	W(21)	%dY	dT	BESEY
GO 47	.4338	1.0266	.383145	.2297875	.4908644
GO 52	.4338	1.0266	.8633004	.3236318	1.198489
GO 71	.4338	1.0266	.4869078	.2247816	.7315529
GO 66	.4338	1.0266	.806684	.2544632	1.025807
GO 67	.4338	1.0266	1.017015	2.93524	1.223426
GO 68	.4338	1.0266	.6153502	.3775923	.8301836
GO 69	.4338	1.0266	.7189496	.2262129	.8663803
GO 74	.4338	1.0266	.239082	.1482286	.346367
GO 48	.4338	1.0266	.7095113	.1337477	1.034915
GO 65	.4338	1.0266	.2884738	.2832712	.3872338
GO 64	.4338	1.0266	.15197	.5079607	.2434976
GO 58	.4338	1.0266	.3901343	.2017566	.4919614
GO 60	.4338	1.0266	.5868305	.2222332	.8541304
GO 76	.4338	1.0266	.5246866	9.542671E-02	
					.5957046
GO 72	.4338	1.0266	.1092392	9.086609E-03	
					.1664878
GO 53	.4338	1.0266	.9214576	.4571096	1.54912
GO 41	.4338	1.0266	.9406964	2.499581E-02	
					1.15471
GO 54	.4338	1.0266	.8505141	.2508879	1.080644
GO 75	.4338	1.0266	1.16762	.1880003	1.50834
GOa53	.4338	1.0266	.3597776	.1935192	.4373548
GOa55	.4338	1.0266	.7349585	.2077208	1.074126
GOa58	.4338	1.0266	.3490258	.3170109	.4596768
GOb29	.4338	1.0266	.8197052	8.442879E-03	
					1.694443

%D(Y1) = .6102188   D(T) = .3400481   %S(Y) .8454529

CH3OH-H2O	# files: 23				
FILE	W(12)	W(21)	%dY	dT	BESEY
GO 47	.4339	1.0264	.383284	.2297875	.4910674
GO 52	.4339	1.0264	.863688	.3236318	1.198937
GO 71	.4339	1.0264	.4868168	.2247816	.7314421
GO 66	.4339	1.0264	.806456	.2544632	1.025545
GO 67	.4339	1.0264	1.016668	2.93524	1.223015
GO 68	.4339	1.0264	.6153303	.3775923	.8299757
GO 69	.4339	1.0264	.7189856	.2262129	.8664375
GO 74	.4339	1.0264	.2391918	.1482286	.3466643
GO 48	.4339	1.0264	.7092211	.1337477	1.034439
GO 65	.4339	1.0264	.2884843	.2832712	.3872824
GO 64	.4339	1.0264	.151895	.5079607	.2434209
GO 58	.4339	1.0264	.3900431	.2017566	.4918998
GO 60	.4339	1.0264	.5867446	.2222332	.8541722
GO 76	.4339	1.0264	.524972	9.542671E-02	
					.5959569
GO 72	.4339	1.0264	.1093245	9.086609E-03	
					.1668288
GO 53	.4339	1.0264	.9214808	.4571096	1.549115
GO 41	.4339	1.0264	.9407106	2.499581E-02	
					1.154632
GO 54	.4339	1.0264	.8504471	.2508879	1.080599
GO 75	.4339	1.0264	1.167314	.1880003	1.508031
GOa53	.4339	1.0264	.3597275	.1935192	.4372467
GOa55	.4339	1.0264	.7351192	.2077208	1.074394
GOa58	.4339	1.0264	.3491315	.3170109	.4598536
GOb29	.4339	1.0264	.8199409	8.442879E-03	
					1.694558

%D(Y1) = .6102165   D(T) = .3400481   %S(Y) .8454571

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```
CH3OH-H2O      # files: 23
FILE          W(12)        W(21)        %dY          dT            BESEY
GO 47         .4339        1.0265       .3829558     .2297875      .490681
GO 52         .4339        1.0265       .8629326     .3236318      1.198243
GO 71         .4339        1.0265       .4875167     .2247816      .7321032
GO 66         .4339        1.0265       .8065495     .2544632      1.025615
GO 67         .4339        1.0265       1.017078     2.93524       1.223747
GO 68         .4339        1.0265       .6155465     .3775923      .830617
GO 69         .4339        1.0265       .7192425     .2262129      .8667392
GO 74         .4339        1.0265       .2392044     .1482286      .3462923
GO 48         .4339        1.0265       .7097051     .1337477      1.034993
GO 65         .4339        1.0265       .2883891     .2832712      .3869053
GO 64         .4339        1.0265       .1519437     .5079607      .2430875
GO 58         .4339        1.0265       .3902351     .2017566      .4917921
GO 60         .4339        1.0265       .5869368     .2222332      .8537913
GO 76         .4339        1.0265       .5245535     9.542671E-02
                                                                   .5954208
GO 72         .4339        1.0265       .1091403     9.086609E-03
                                                                   .1663824
GO 53         .4339        1.0265       .9207619     .450443       1.549391
GO 41         .4339        1.0265       .9399594     2.499581E-02
                                                                   1.153724
GO 54         .4339        1.0265       .8508778     .2508879      1.08103
GO 75         .4339        1.0265       1.167245     .1880003      1.507906
GOa53         .4339        1.0265       .3601596     .1935192      .4378734
GOa55         .4339        1.0265       .7348643     .2077208      1.07381
GOa58         .4339        1.0265       .348868      .3170109      .4594864
GOb29         .4339        1.0265       .8193823     8.442879E-03
                                                                   1.693812
%D(Y1)= .610176              D(T)= .3397583          %S(Y) .8453671
CH3OH-H2O      # files: 23
FILE          W(12)        W(21)        %dY          dT            BESEY
GO 47         .4339        1.0266       .3826259     .2297875      .4902937
GO 52         .4339        1.0266       .8624197     .3236318      1.197553
GO 71         .4339        1.0266       .4882158     .2247816      .7327648
GO 66         .4339        1.0266       .8066445     .2544632      1.025684
GO 67         .4339        1.0266       1.01749      2.93524       1.224483
GO 68         .4339        1.0266       .6157658     .3775923      .8312614
GO 69         .4339        1.0266       .7202764     .2353037      .8678569
GO 74         .4339        1.0266       .2392143     .1482286      .3459223
GO 48         .4339        1.0266       .7101911     .1337477      1.035549
GO 65         .4339        1.0266       .288293      .2832712      .3865312
GO 64         .4339        1.0266       .1519909     .5079607      .2427583
GO 58         .4339        1.0266       .3904287     .2017566      .491688
GO 60         .4339        1.0266       .5871305     .2222332      .8534115
GO 76         .4339        1.0266       .5241362     9.542671E-02
                                                                   .5948893
GO 72         .4339        1.0266       .1089567     9.086609E-03
                                                                   .1659411
GO 53         .4339        1.0266       .9207761     .450443       1.549761
GO 41         .4339        1.0266       .939208      2.499581E-02
                                                                   1.152819
GO 54         .4339        1.0266       .8513109     .2508879      1.081464
GO 75         .4339        1.0266       1.167177     .1880003      1.507782
GOa53         .4339        1.0266       .3605887     .1935192      .438498
GOa55         .4339        1.0266       .7346116     .2077208      1.073228
GOa58         .4339        1.0266       .3489708     .3253441      .4593098
GOb29         .4339        1.0266       .8188248     8.442879E-03
                                                                   1.693067
%D(Y1)= .6102281             D(T)= .3405159          %S(Y) .8453268
```

CH3OH-H2O   # files: 23

FILE	W(12)	W(21)	%dY	dT	BESEY
GO 47	.4338	1.0264	.3838023	.2297875	.4916451
GO 52	.4338	1.0264	.864862	.3236318	1.19988
GO 71	.4338	1.0264	.4859722	.2237938	.7303062
GO 66	.4338	1.0264	.8064961	.2544632	1.025672
GO 67	.4338	1.0264	1.016192	2.93524	1.22196
GO 68	.4338	1.0264	.6149121	.3775923	.8288973
GO 69	.4338	1.0264	.7184356	.2262129	.86578
GO 74	.4338	1.0264	.2390589	.1482286	.3471144
GO 48	.4338	1.0264	.7085421	.1337477	1.033808
GO 65	.4338	1.0264	.2886673	.2832712	.3879928
GO 64	.4338	1.0264	.1518749	.5079607	.2441709
GO 58	.4338	1.0264	.3897479	.2017566	.4921797
GO 60	.4338	1.0264	.5864446	.2222332	.8548961
GO 76	.4338	1.0264	.5255206	9.542671E-02	
					.596775
GO 72	.4338	1.0264	.1096064	9.086609E-03	
					.1673767
GO 53	.4338	1.0264	.9214258	.4571096	1.548382
GO 41	.4338	1.0264	.9421997	2.499581E-02	
					1.156527
GO 54	.4338	1.0264	.8496502	.2508879	1.079781
GO 75	.4338	1.0264	1.167759	.1880003	1.508593
GOa53	.4338	1.0264	.3589158	.1935192	.4361039
GOa55	.4338	1.0264	.7354644	.2077208	1.075292
GOa58	.4338	1.0264	.3495524	.3170109	.4604169
GOb29	.4338	1.0264	.8208213	8.442742E-03	
					1.695934

%D(Y1) = .6102576   D(T) = .3400052   %S(Y) .8456296

CH3OH-H2O   # files: 23

FILE	W(12)	W(21)	%dY	dT	BESEY
GO 47	.4338	1.0265	.3834738	.2297875	.4912535
GO 52	.4338	1.0265	.8640808	.3236318	1.199184
GO 71	.4338	1.0265	.4866742	.2237938	.7309651
GO 66	.4338	1.0265	.8065903	.2544632	1.025739
GO 67	.4338	1.0265	1.016604	2.93524	1.222693
GO 68	.4338	1.0265	.61513	.3775923	.8295387
GO 69	.4338	1.0265	.7186938	.2262129	.8660806
GO 74	.4338	1.0265	.2390694	.1482286	.3467386
GO 48	.4338	1.0265	.7090278	.1337477	1.034362
GO 65	.4338	1.0265	.2885692	.2832712	.3876109
GO 64	.4338	1.0265	.1519213	.5079607	.2438308
GO 58	.4338	1.0265	.3899408	.2017566	.4920693
GO 60	.4338	1.0265	.5866381	.2222332	.8545125
GO 76	.4338	1.0265	.5251041	9.542671E-02	
					.5962381
GO 72	.4338	1.0265	.1094216	9.086609E-03	
					.1669289
GO 53	.4338	1.0265	.921443	.4571096	1.548752
GO 41	.4338	1.0265	.9414477	2.499581E-02	
					1.155618
GO 54	.4338	1.0265	.850082	.2508879	1.080212
GO 75	.4338	1.0265	1.16769	.1880003	1.508467
GOa53	.4338	1.0265	.3593475	.1935192	.4367297
GOa55	.4338	1.0265	.7352101	.2077208	1.074708
GOa58	.4338	1.0265	.3492897	.3170109	.4600455
GOb29	.4338	1.0265	.8202638	8.442742E-03	
					1.695188

%D(Y1) = .6102484   D(T) = .3400052   %S(Y) .8455419

```
CH3OH-H2O      # files: 23
FILE        W(12)         W(21)        %dY          dT            BESEY
GO 47       .434          1.0264       .3827669     .2297875      .4904993
GO 52       .434          1.0264       .8628009     .3236318      1.197999
GO 71       .434          1.0264       .4881235     .2247816      .7326546
GO 66       .434          1.0264       .8064161     .2544632      1.025421
GO 67       .434          1.0264       1.017142     2.93524       1.224069
GO 68       .434          1.0264       .6157453     .3775923      .8310552
GO 69       .434          1.0264       .7203119     .2353037      .8679134
GO 74       .434          1.0264       .239326      .1482286      .3462203
GO 48       .434          1.0264       .7098998     .1337477      1.035072
GO 65       .434          1.0264       .288302      .2832712      .3865759
GO 64       .434          1.0264       .1519161     .5079607      .242678
GO 58       .434          1.0264       .3903366     .2017566      .4916249
GO 60       .434          1.0264       .5870446     .2222332      .8534536
GO 76       .434          1.0264       .5244225     9.542671E-02
                                                                  .5951423
GO 72       .434          1.0264       .1090431     9.086609E-03
                                                                  .1662809
GO 53       .434          1.0264       .9208008     .450443       1.549755
GO 41       .434          1.0264       .9392218     2.499581E-02
                                                                  1.152739
GO 54       .434          1.0264       .8512415     .2508879      1.081416
GO 75       .434          1.0264       1.166871     .1880003      1.507472
GOa53       .434          1.0264       .360542      .1935192      .4383925
GOa55       .434          1.0264       .7347743     .2077208      1.073498
GOa58       .434          1.0264       .348713      .3170109      .4593004
GOb29       .434          1.0264       .8190602     8.442879E-03
                                                                  1.693183
%D(Y1)= .6102096          D(T)= .3401535                %S(Y) .8453222
CH3OH-H2O      # files: 23
FILE        W(12)         W(21)        %dY          dT            BESEY
GO 47       .434          1.0265       .3817703     .2356698      .4897002
GO 52       .434          1.0265       .8614304     .3307746      1.196549
GO 71       .434          1.0265       .4888252     .2247816      .7333191
GO 66       .434          1.0265       .8065113     .2544632      1.025492
GO 67       .434          1.0265       1.017554     2.93524       1.224805
GO 68       .434          1.0265       .6159633     .3775923      .8316986
GO 69       .434          1.0265       .7205703     .2353037      .8682188
GO 74       .434          1.0265       .2402113     .1405364      .3460899
GO 48       .434          1.0265       .7113313     .142081       1.035988
GO 65       .434          1.0265       .2882044     .2832712      .3862003
GO 64       .434          1.0265       .1519653     .5079607      .24235
GO 58       .434          1.0265       .3905301     .2017566      .491523
GO 60       .434          1.0265       .5872385     .2222332      .8530762
GO 76       .434          1.0265       .5240053     9.542671E-02
                                                                  .5946108
GO 72       .434          1.0265       .1088595     9.086609E-03
                                                                  .1658368
GO 53       .434          1.0265       .9208166     .450443       1.550127
GO 41       .434          1.0265       .9384714     2.499581E-02
                                                                  1.151833
GO 54       .434          1.0265       .8516729     .2508879      1.081849
GO 75       .434          1.0265       1.166801     .1880003      1.507346
GOa53       .434          1.0265       .3615138     .1982811      .4398372
GOa55       .434          1.0265       .7345188     .2077208      1.072915
GOa58       .434          1.0265       .348815      .3253441      .4591253
GOb29       .434          1.0265       .8185029     8.442742E-03
                                                                  1.692439
%D(Y1)= .6102645          D(T)= .3413171                %S(Y) .8452577
```

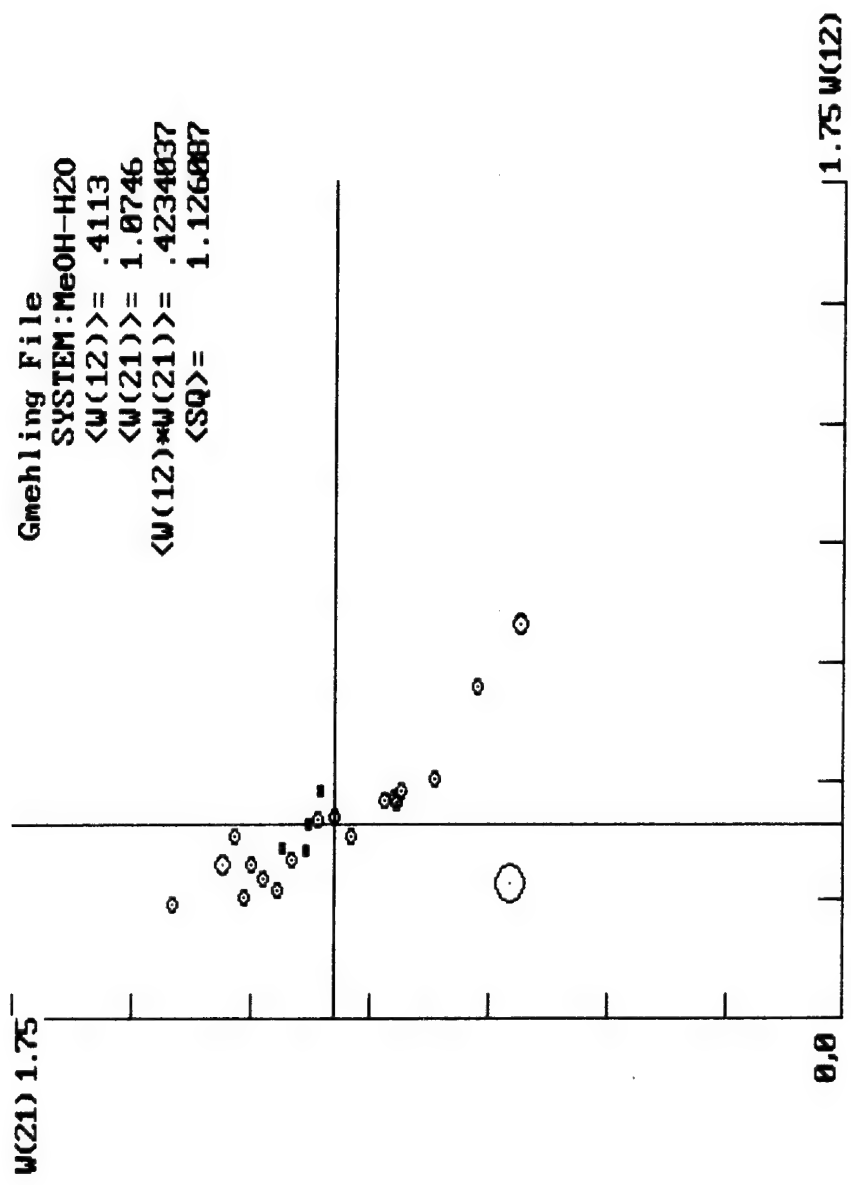| FILE	W(12)	W(21)	%dY	dT	BESEY
GO 47	.434	1.0266	.3814425	.2356698	.489322
GO 52	.434	1.0266	.8609184	.3307746	1.195862
GO 71	.434	1.0266	.4895235	.2247816	.7339838
GO 66	.434	1.0266	.8066053	.2544632	1.025564
GO 67	.434	1.0266	1.019112	2.944331	1.226897
GO 68	.434	1.0266	.616183	.3775923	.8323446
GO 69	.434	1.0266	.7208228	.2353037	.8685222
GO 74	.434	1.0266	.2402232	.1405364	.3457308
GO 48	.434	1.0266	.7118141	.142081	1.036543
GO 65	.434	1.0266	.2881092	.2832712	.3858298
GO 64	.434	1.0266	.1520097	.5079607	.2420241
GO 58	.434	1.0266	.390723	.2017566	.4914216
GO 60	.434	1.0266	.58743	.2222332	.8526979
GO 76	.434	1.0266	.5235881	9.542671E-02	.5940811
GO 72	.434	1.0266	.1086754	9.086609E-03	.1653951
GO 53	.434	1.0266	.9208296	.450443	1.550496
GO 41	.434	1.0266	.9377206	2.499581E-02	1.15093
GO 54	.434	1.0266	.8521048	.2508879	1.082283
GO 75	.434	1.0266	1.166733	.1880003	1.507224
GOa53	.434	1.0266	.3624882	.2030429	.4409905
GOa55	.434	1.0266	.7342675	.2077208	1.072336
GOa58	.434	1.0266	.3485516	.3253441	.4587661
GOb29	.434	1.0266	.8179458	8.442879E-03	1.691691

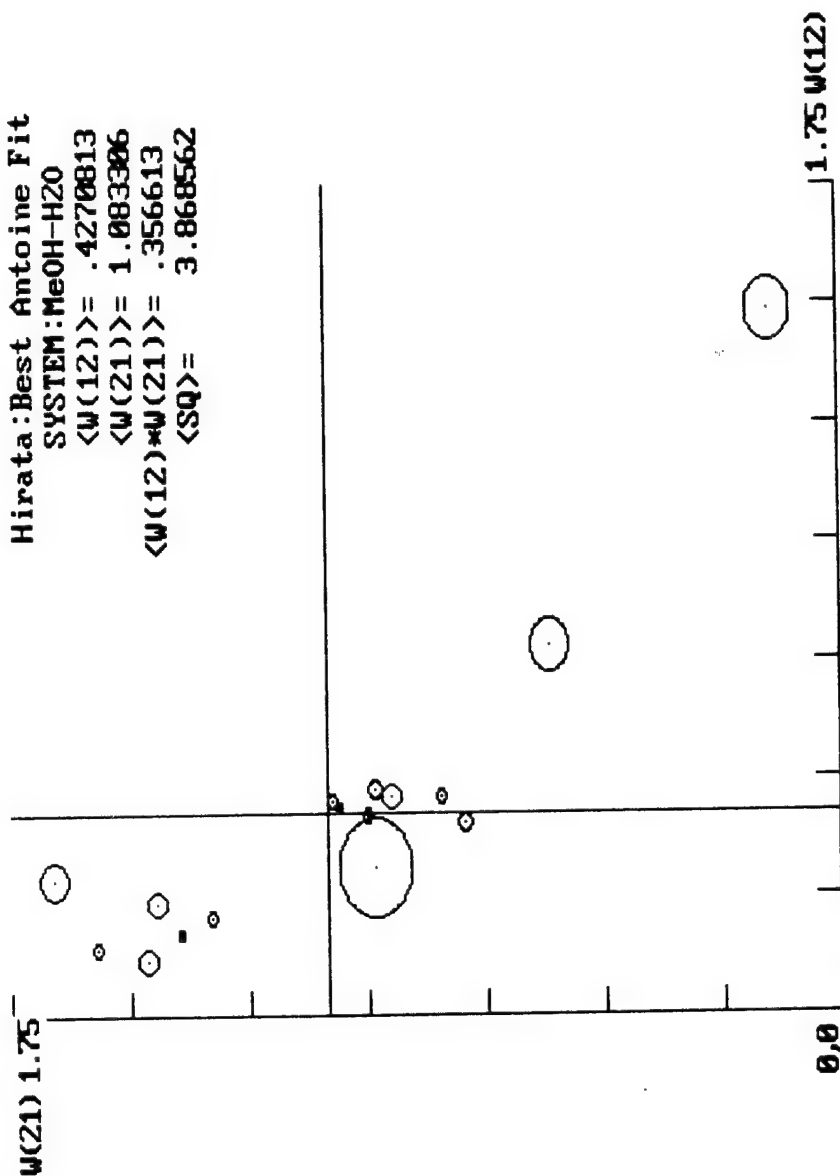%D(Y1)= .61034   D(T)= .3419194   %S(Y) .8452581

```
100 'LVSEARCH.BAS, A: 10/02/95 COPYRIGHT 1994 by P. E. Field, IO ASSO./VTECHEM
110 SCREEN 9: KEY OFF: READ C1$,C2$,F: DIM AP(3,2): NF=1: GOSUB 400
120 DIM X(NM,2),Y(NM,2),PT(NM,2),D(NM,2),QC(NM),QD(NM),QE(NM),LP(NM,2),R(NM)
122 INPUT "W12:Starting value, Ending value, # steps";W1L,W1H,W1S
124 INPUT "W21:Starting value, Ending value, # steps";W2L,W2H,W2S
126 W1S=(W1H-W1L)/W1S: W2S=(W2H-W2L)/W2S
130 FOR G1=W1L TO W1H STEP W1S: FOR G2=W2L TO W2H STEP W2S
140 PRINT C1$;"-";C2$,"# files:";F: PRINT "FILE";TAB(12);
145 PRINT "W(12)";TAB(24);"W(21)";TAB(36);"%dY";TAB(48);"dT";TAB(60);"BESEY"
150 LPRINT C1$;"-";C2$,"# files:";F: LPRINT "FILE";TAB(12);
155 LPRINT "W(12)";TAB(24);"W(21)";TAB(36);"%dY";TAB(48);"dT";TAB(60);"BESEY"
210 SUMY=0: SUMT=0: SUME=0
220 FOR NF=1 TO F: GOSUB 400
230 FOR J=1 TO N: READ X(J,1),Y(J,1),D: IF C3=1 THEN PT(J,2)=D ELSE PT(J,1)=D
240 IF C3=1 THEN PT(J,1)=C4 ELSE PT(J,2)=C4
250 X(J,2)=1-X(J,1): Y(J,2)=1-Y(J,1): NEXT J
260 FOR K=1 TO N
270 LP(K,1)=LOG(10)*(AP(1,1)-AP(2,1)/(PT(K,2)+AP(3,1)))-LOG(PT(K,1))
280 LP(K,2)=LOG(10)*(AP(1,2)-AP(2,2)/(PT(K,2)+AP(3,2)))-LOG(PT(K,1))
290 NEXT K
310 T=PT(1,2): IF C3=1 THEN T=1.05*T
320 SS=0: SY=0: ST=0: FOR K=1 TO N: X=X(K,1): Z=1-X
330 IF C3=2 THEN T=PT(1,2)
340 GOSUB 500: Y1=PA/PC: SS=SS+(Y1-Y(K,1))^2
350 SY=SY+ABS(Y1-Y(K,1)): ST=ST+ABS(T-PT(K,2)): NEXT K
360 PRINT NF$;TAB(12);G1;TAB(24);G2;TAB(36);100*SY/N;TAB(48);ST/N;TAB(60);
        SQR(SS/N)*100
365 LPRINT NF$;TAB(12);G1;TAB(24);G2;TAB(36);100*SY/N;TAB(48);ST/N;TAB(60);
        SQR(SS/N)*100
370 SUMY=SUMY+SY/N: SUMT=SUMT+ST/N: SUME=SUME+SQR(SS/N): NEXT NF
380 LPRINT "%D(Y1)=";100*SUMY/F,"D(T)=";SUMT/F,"%S(Y)";100*SUME/F
385 PRINT "%D(Y1)=";100*SUMY/F,"D(T)=";SUMT/F,"%S(Y)";100*SUME/F
390 NEXT G2: NEXT G1: LPRINT CHR$(12): END
400 RESTORE: READ X$,X$,X
410 FOR I=1 TO F: READ NF$,C3,C4,N
420 IF C3=1 THEN C3$="ISOBAR" ELSE C3$="ISOTHERM"
425 IF N>=NM THEN NM=N
430 FOR J=1 TO N: READ X,X,X: NEXT J: NEXT I
440 FOR J=1 TO 2: READ C$(J)
450 FOR K=1 TO 3: READ AP(K,J): NEXT K: NEXT J
460 RESTORE: READ X$,X$,X
470 FOR I=1 TO NF: READ NF$,C3,C4,N: IF I<NF THEN GOTO 490
480 NEXT I: RETURN
490 FOR J=1 TO N: READ X,X,X: NEXT J: GOTO 480
500 M=0: SP=-.1
510 GA=EXP(-LOG(X+G1*Z)+Z*(G1/(X+G1*Z)-(G2/(G2*X+Z))))
520 GB=EXP(-LOG(Z+G2*X)-X*(G1/(X+G1*Z)-(G2/(G2*X+Z))))
530 P1=EXP(LOG(10)*(AP(1,1)-AP(2,1)/(T+AP(3,1))))
540 P2=EXP(LOG(10)*(AP(1,2)-AP(2,2)/(T+AP(3,2))))
550 PA=GA*P1*X: PB=GB*P2*Z: PC=PA+PB
560 IF PO=PC THEN RETURN
565 IF (PC>.995*PT(N,1) AND PC<1.005*PT(N,1)+1) THEN RETURN
570 IF INT(PC+.5)>PT(N,1) THEN 590
580 IF INT(PC+.5)<PT(N,1) THEN SP=-SP/10
590 T=T+SP: PO=PC: GOTO 530
```
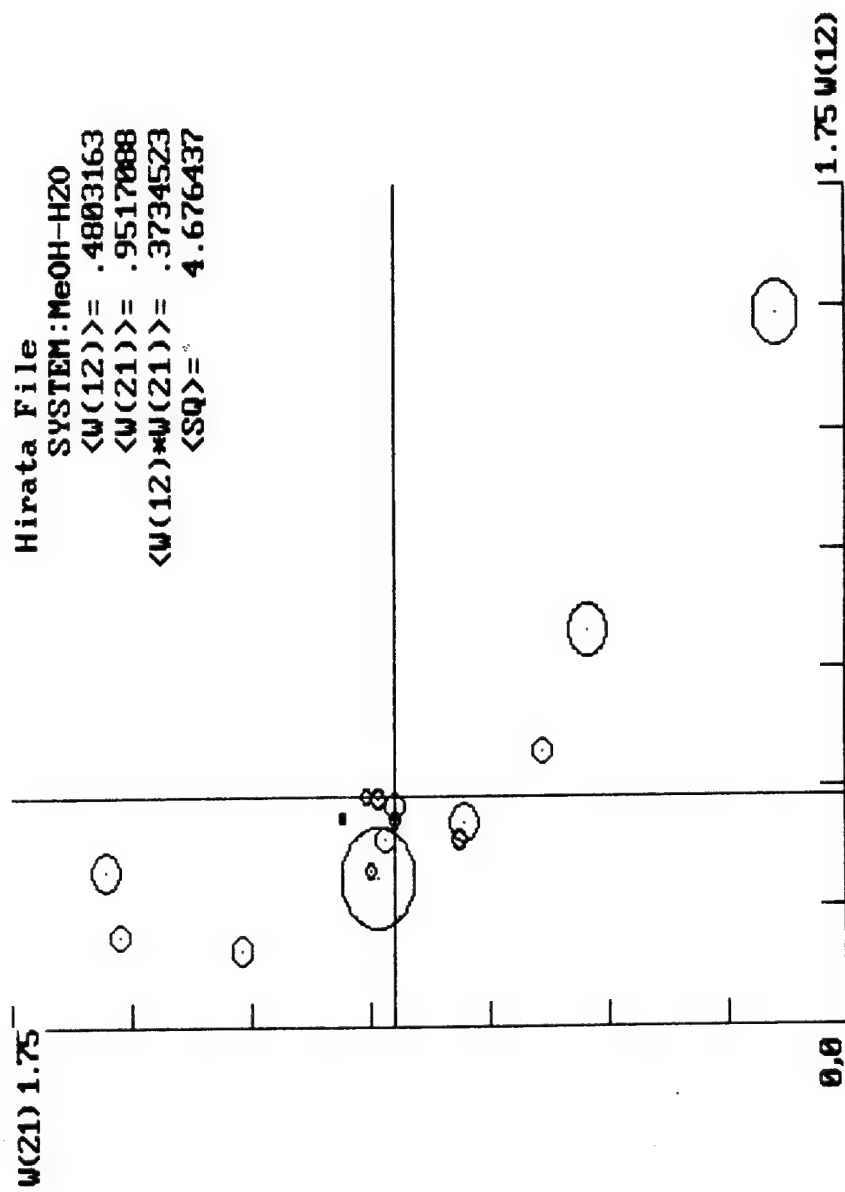
APPENDIX D
PROGRAMS WILSONMW.BAS AND ANTOINE3.BAS

Gmehling File
SYSTEM:MeOH-H2O
<W(12)>= .4113
<W(21)>= 1.0746
<W(12)*W(21)>= .4234037
<SQ>= 1.126087

W(21) 1.75

1.75 W(12)

0,0

Hirata:Best Antoine Fit
SYSTEM:MeOH-H20
<W(12)>= .4270813
<W(21)>= 1.083396
<W(12)*W(21)>= .356613
<SQ>= 3.868562

W(21) 1.75

1.75 W(12)

0,0

Hirata File
SYSTEM:MeOH-H2O
<W(12)>= .4803163
<W(21)>= .9517088
<W(12)*W(21)>= .3734523
<SQ>= 4.676437

W(21) 1.75

1.75 W(12)

0,0

```
5 DATA 20,4,52,38,54,62,22,2,3,57,9,13,5,7,63
9 ' DECHEMA files
10 DATA "MeOH-H2O",23: 'W(12),W(21),Pi,Pf,Tf,Ti,dY: 'GO(N)
11 DATA .8308,.6861,200,200,36,65,1.62: '66(11)
12 DATA .3854,1.2828,350,350,46,80,1.19: '64(12)
13 DATA .2872,.7056,390,390,47,75,5.59: '67(11)
14 DATA .4648,.9485,500,500,56,85,0.57: '68(11)
15 DATA .5049,.8662,760,7660,66,93,0.90: '69(11)
16 DATA .7017,.7733,760,760,665,100,1.23: '48(12)
17 DATA .2573,1.2654,760,760,65,100,1.36: 'a58(12)
18 DATA .2400,1.4169,760,760,65,100,0.84: '65(12)
19 DATA .3597,1.1872,760,760,65,100,0.25: '74(13)
20 DATA .4610,.9686,760,760,67,89,0.64: '76(13)
21 DATA .4569,.9471,760,760,66,95,1.31: '52(14)
22 DATA .3253,1.3106,760,760,66,94,1.69: '75(14)
23 DATA .3245,1.2497,760,760,67,95,1.17: '53(15)
24 DATA .4820,.9365,760,760,66,97,0.84: '54(16)
25 DATA .2710,1.1943,760,760,65,94,1.48: 'a55(16)
26 DATA .3844,1.0380,760,7660,65,100,0.90: '47(17)
27 DATA .4265,1.0734,760,760,66,95,0.79: '71(21)
28 DATA .3552,1.1342,760,760,65,100,0.24: 'a53(21)
29 DATA .2964,1.2247,760,760,66,97,1.22: '60(27)
30 DATA .3355,1.1629,760,760,65,99,0.71: '58(34)
31 DATA .4775,1.1046,31,127,25,25,0.34: 'b29(14)
32 DATA .4104,1.1306,126,258,40,40,0.25: '72(10)
33 DATA .4215,1.1086,184,538,60,60,0.77: '41(12)
49 'Hirata File refitted to best Antoine pairs 6/2/94
50 DATA "MeOH-H2O",16: ' W(12),W(21),Pi,Pf,Tf,Ti,SQ: 'FN(N)
51 DATA .4069,.7956,735,735,66,97,1.66e-3: '513(8)
52 DATA 1.4842,.1513,760,760,71,93,1.12e-2: '514(16)
53 DATA .4182,1.0010,760,760,65,96,0.57e-3: '515(15)
54 DATA .4753,.9836,760,760,66,96,2.46e-3: '516(21)
55 DATA .4616,.9516,760,760,65,96,3.17e-3: '517(14)
56 DATA .7782,.6153,760,760,64,100,8.84e-3: '518(26)
57 DATA .3118,.9866,2280,2280,96,134,1.88e-2: '519(22)
58 DATA .1136,1.4664,3800,3800,112,148,2.71e-3: '520(22)
59 DATA .4621,.8473,6080,6080,129,167,1.00e-3: '521(22)
60 DATA .2073,1.3306,8512,8512,143,182,0.93e-3: '522(22)
61 'DATA .7618,.7387,68,245,40,40,1e-2: '523*(21)est.SQ
62 DATA .2842,1.6579,119,391,50,50,6.30e-3: '524(12)
63 DATA .4505,1.0747,183,539,60,60,7.10e-4: '525(12)
64 DATA .2333,1.4452,780,2529,100,100,2.57e-3: '526(12)
65 DATA .4359,1.0598,3822,7940,140,140,2.97e-4: '527(6)
66 DATA .1709,1.3959,3790,10298,150,150,0.17e-3: '528(11)
67 DATA .1393,1.5701,12205,29580,200,200,0.51e-3: '529(11)
69 'Hirata Antione coefficients
70 DATA "MeOH-H2O",16: ' W(12),W(21),Pi,Pf,Tf,Ti,SQ: 'FN(N)
71 DATA .38971,.81592,735,735,66,97,1.70e-3: '513(8)
72 DATA 1.48422,.15135,760,760,71,93,1.12e-2: '514(16)
73 DATA .43045,.94934,760,760,65,96,1.03e-3: '515(15)
74 DATA .47525,.98358,760,760,66,96,2.46e-3: '516(21)
75 DATA .46158,.95158,760,760,65,96,3.30e-3: '517(14)
76 DATA .82908,.54723,760,760,64,100,8.96e-3: '518(26)
77 DATA .31180,.98657,2280,2280,96,134,1.88e-2: '519(22)
78 DATA .15774,1.27096,3800,3800,112,148,4.28e-3: '520(22)
79 DATA .32460,1.00187,6080,6080,129,167,1.05e-3: '521(22)
```

```
80 DATA .38817,.97137,8512,8512,143,182,2.53e-3: '522(22)
81 'DATA .76179,.73867,68,245,40,40,1e-2: '523*(21)est.SQ
82 DATA .32260,1.55711,119,391,50,50,6.30e-3: '524(12)
83 DATA .48125,1.01184,183,539,60,60,7.56e-4: '525(12)
84 DATA .19087,1.52444,780,2529,100,100,2.93e-3: '526(12)
85 DATA .43586,1.05982,3822,7940,140,140,2.97e-4: '527(6)
86 DATA .57571,.63886,3790,10298,150,150,3.22e-3: '528(11)
87 DATA .42617,.80550,12205,29580,200,200,6.01e-3: '529(11)
90 SCREEN 9: KEY OFF: CLS
91 FOR I=1 TO 15
92 READ K
93 PALETTE I,K
94 NEXT I
100 'WILSONMW.BAS 11/16/93 - 6/10/94 - 11/6/95
105 R=0
110 READ N$,N: IF R=0 THEN DIM W1(N),W2(N),SQ(N),WP(N)
115 R=R+1: S1=0: S2=0: SP=0: SS=0: GOSUB 300
120 FOR I=1 TO N: READ W1(I),W2(I),X1,X2,Y1,Y2,SQ(I)
125 IF SQ(I)<.1 THEN SQ(I)=1000*SQ(I)
130 C=INT(1000*SQ(I)+.5)/1000: IF C=0 THEN C=1
140 CIRCLE (150+200*W1(I),350-200*W2(I)),C+2,15
150 PSET (150+200*W1(I),350-200*W2(I)),15: IF C>50 THEN GOSUB 350
160 S1=S1+W1(I): S2=S2+W2(I): SP=SP+W1(I)*W2(I): SS=SS+SQ(I)
162 ON R GOTO 164,165,166
164 T$="Gmehling File": GOTO 168
165 T$="Hirata:Best Antoine Fit": GOTO 168
166 T$="Hirata File"
168 LOCATE 1,45: PRINT T$
170 NEXT I: LOCATE 2,50: PRINT "SYSTEM:";N$
180 S1=S1/N: S2=S2/N: SP=SP/N: SS=SS/N
190 LOCATE 3,50: PRINT "<W(12)>=";S1: LOCATE 4,50: PRINT "<W(21)>=";S2
200 LOCATE 5,44: PRINT "<W(12)*W(21)>=";SP: LOCATE 6,50: PRINT "<SQ>=   ";SS
210 LINE (150,350-200*S2)-(500,350-200*S2),14
220 LINE (150+200*S1,0)-(150+200*S1,349),14
230 C=INT(1000*SS+.5): CIRCLE (150+200*S1,350-200*S2),C+2,14
240 PW=S1*S2: PZ=.3392
250 'FOR X=.02 TO 1.7 STEP .001: Y=EXP(-1.0309*LOG(X)-1.113876):
          'Y=EXP(-.7465*LOG(X)-.8133)
252 'PSET (150+200*X,350-200*Y),4
255 'PSET (150+200*X,350-200*PZ/X),6
260 'Y=EXP(-.7465*LOG(X)-.8133)
261 'PSET (150+200*X,350-200*PW/X),14
262 'PSET (150+200*X,350-200*Y),8
265 'NEXT X: 'PSET (150+200*X,350-200*SP/X),15: NEXT X
270 'LOCATE 24,64: PRINT PW;
280 'LOCATE 23,64: PRINT "<W(12)><W(21)>";
290 WHILE INKEY$="": WEND: CLS: IF R>0 THEN 110
300 LINE (150,0)-(150,349): LINE -(500,349)
310 X=150: FOR Y=0 TO 349 STEP 50: LINE (X,Y)-(X+10,Y): NEXT Y
320 Y=349: FOR X=150 TO 500 STEP 50: LINE (X,Y)-(X,Y-10): NEXT X
330 LOCATE 1,10: PRINT "W(21) 1.75";: LOCATE 25,16: PRINT "0,0";:
340 LOCATE 25,64: PRINT "1.75 W(12)";: RETURN
350 FOR X=200*W1(I)+140 TO 200*W1(I)+160: PSET (X,350-200*W2(I)): NEXT X
360 FOR Y=340-200*W2(I) TO 360-200*W2(I): PSET (150+W1(I)*200,Y): NEXT Y
370 RETURN
```

deg C	MeOH	MeOH-1	MeOH-2
0	30.24395	29.77173	30.29989
5	41.25627	40.74523	41.35473
10	55.58296	55.03921	55.74205
15	74.01349	73.44062	74.25671
20	97.47487	96.87022	97.83155
25	127.0446	126.3946	127.5514
30	163.9661	163.2384	164.6677
35	209.6616	208.7972	210.6117
40	265.7463	264.6469	267.0088
45	334.0408	332.5574	335.6913
50	416.5847	414.4987	418.7105
55	515.6479	512.6523	518.3498
60	633.7411	629.42	637.1338
65	773.627	767.4268	777.8406
70	938.3284	929.5304	943.5082
75	1131.135	1118.823	1137.443
80	1355.613	1338.635	1363.229
85	1615.607	1592.542	1624.726
90	1915.249	1884.349	1926.082
95	2258.95	2218.114	2271.729
100	2651.419	2598.129	2666.391

Press any key to continue.

deg C	H2O	H2O-1	H2O-2
0	4.542224	4.467862	4.566928
5	6.497518	6.413731	6.528166
10	9.158814	9.068276	9.196561
15	12.73296	12.64004	12.77927
20	17.47324	17.3843	17.53005
25	23.68642	23.60995	23.7564
30	31.74017	31.68693	31.82711
35	42.07109	42.05392	42.18025
40	55.19285	55.2263	55.33161
45	71.70461	71.8044	71.88336
50	92.29985	92.48154	92.5327
55	117.7751	118.0526	118.0812
60	149.0384	149.4221	149.4435
65	187.1185	187.6122	187.6563
70	233.1732	233.7707	233.8876
75	288.4975	289.1791	289.4449
80	354.5325	355.2584	355.7836
85	432.8705	433.5767	434.5166
90	525.2667	525.8563	527.4176
95	633.6401	633.977	636.4334
100	760.006	759.9835	763.687

Press any key to continue.

```
10 DATA "MeCOMe",7.11714,1210.595,229.664: 'DEC
11 DATA "MeCOMe-1",7.02447,1161.000,224.000: 'HIR
12 DATA "MeCOMe-2",7.23967,1279.870,237.500: 'HIR
20 DATA "MeOH",8.08097,1582.271,239.726: 'DEC
21 DATA "MeOH-1",7.87863,1473.110,230.000
22 DATA "MeOH-2",8.07246,1574.990,238.960
30 DATA "EtOH",8.11220,1592.864,226.184: 'DEC
31 DATA "EtOH-1",8.04494,1554.300,222.650
32 DATA "EtOH-2",8.16290,1623.220,228.980
40 DATA "MeCOEt",7.06356,1261.340,221.969: 'DEC
41 DATA "MeCOEt-1",6.97421,1209.600,216.000
42 DATA "EtAc",7.10232,1245.239,217.911
50 DATA "iPrOH",8.87829,2010.330,252.636: 'DEC
51 DATA "iPrOH-1",6.66040,813.055,132.930
52 DATA "iPrOH-2",7.75634,1366.142,197.970
60 DATA "H2O",8.07131,1730.630,233.426: 'DEC
61 DATA "H2O-1",7.96681,1668.210,228.000
62 DATA "H2O-2",8.10765,1750.286,235.000
100 SCREEN 9: KEY OFF: CLS: 'ANTOINE3.BAS 1/26/96
110 FOR S=1 TO 6: PRINT "deg C",;: FOR I=1 TO 3: READ A$(I): PRINT A$(I),;:
120 FOR J=1 TO 3: READ A(I,J): NEXT J: NEXT I: PRINT
130 FOR T=0 TO 100 STEP 5: PRINT T,;: FOR I= 1 TO 3
140 P=EXP(LOG(10)*(A(I,1)-A(I,2)/(T+A(I,3))))
150 PRINT P,;: NEXT I: PRINT: NEXT T
160 PRINT "Press any key to continue.";
170 WHILE INKEY$="": WEND: CLS: NEXT S
```

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APPENDIX E
PROGRAM VPVOCH2O.BAS

Select Wilson SET:1.DEC Best;2.DEC Mean;3.DEC G0a;4.Hirata Best? 1
T, deg C? 22.0

WILSON COEFFICIENTS: W(row,col)

A	.1743	.405
E	.2002	.8213
K	.0482	.2508
M	.4339	1.0265
P	9.350001E-02	.6638

ANTOINE VAPOR PRESSURE COEFFICIENTS: log P=A-B/(t+C)

1	A	MeCOMe	7.11714	1210.595	229.664
2	E	EtOH	8.1122	1592.864	226.184
3	K	MeCOEt	7.06356	1261.34	221.969
4	M	MeOH	8.08097	1582.271	239.726
5	P	iPrOH	8.87829	2010.33	252.636
6	W	H2O	8.07131	1730.63	233.426

VOC#? 4

Po(i):
MeOH(1)   H2O(2)
108.5039   19.76262
MOLE %(100 to quit):VOC? 2.52
MeOH(1)   H2O(2)
2.5%= 5.8 TORR 97.5%= 19.3 TORR @ 22 C
= 4.39wt%   =95.61wt%

MOLE %(100 to quit):VOC? ▮

```
10 'MW;W(ij),W(ji):DEC Best/DEC Mean/DEC GOa/HIR Best
11 DATA "A",58.1,.1743,.4050,.1646,.4806,.1482,.3488,.1768,.5148
12 DATA "E",46.1,.2002,.8213,.1854,.8534,.1586,.9219,.1950,.9104
13 DATA "K",72.1,.0482,.2508,.0759,.2733,.0628,.1994,.0242,.2721
14 DATA "M",32.0,.4339,1.0265,.4113,1.0746,.3694,1.0124,.4085,1.0900
15 DATA "P",60.1,.0935,.6638,.0999,.6401,.1113,.5150,.0989,.6597
16 DATA "W",18.0,0,0,0,0,0,0,0,0
20 'Gmehling DECHEMA set
21 DATA "MeCOMe",7.11714,1210.595,229.664
22 DATA "EtOH",8.11220,1592.864,226.184
23 DATA "MeCOEt",7.06356,1261.340,221.969
24 DATA "MeOH",8.08097,1582.271,239.726
25 DATA "iPrOH",8.87829,2010.330,252.636
26 DATA "H2O",8.07131,1730.630,233.426
30 'HIRATA set #1
31 'DATA "MeCOMe-1",7.02447,1161.000,224.000
32 'DATA "EtOH-1",8.04494,1554.300,222.650
33 'DATA "MeCOEt-1",6.97421,1209.600,216.000
34 'DATA "MeOH-1",7.87863,1473.110,230.000
35 'DATA "iPrOH-1",6.66040,813.055,132.930
36 'DATA "H2O-1",7.96681,1668.210,228.000
40 'HIRATA set #2
41 'DATA "MeCOMe-2",7.23967,1279.870,237.500
42 'DATA "EtOH-2",8.16290,1623.220,228.980
43 'DATA "MeCOEt-1",6.97421,1209.600,216.000
44 'DATA "MeOH-2",8.07246,1574.990,238.860
45 'DATA "iPrOH-2",7.75634,1366.142,197.970
46 'DATA "H2O-2",8.10765,1750.286,235.00
100 DIM MW(6),W(6,6), AP(3,6): SCREEN 9: KEY OFF: CLS: 'VPVOCH2O.BAS 1-26-96
102 INPUT "Select Wilson SET:1.DEC Best;2.DEC Mean;3.DEC GOa;4.Hirata Best";CH
110 INPUT "T, deg C";T: FOR S=1 TO 6: READ C$(S),MW(S): FOR K=1 TO 4:
120 READ X1,X2: IF K<>CH THEN 140
130 W(S,6)=X1: W(6,S)=X2
140 NEXT K: W(S,S)=1: NEXT S
150 PRINT TAB(25);"WILSON COEFFICIENTS: W(row,col)"
160 FOR I=1 TO 5: PRINT TAB(8);C$(I);TAB(30);;W(I,6);TAB(45);W(6,I): NEXT I
170 PRINT: PRINT TAB(14);"ANTOINE VAPOR PRESSURE COEFFICIENTS: log P=A-B/(t+C)"
180 FOR I=1 TO 6: READ N$(I): FOR J=1 TO 3: READ AP(J,I): NEXT J: NEXT I
190 FOR I=1 TO 6: PRINT I;"   ";C$(I),N$(I),;
200 FOR J=1 TO 3: PRINT AP(J,I),;: NEXT J: NEXT I
210 INPUT "VOC#";C(1): C(2)=6:
215 FOR I=1 TO 2: PRINT ,N$(C(I));"(";I;")  ";;: NEXT I
220 PRINT: PRINT "Po(i):";;: FOR I=1 TO 2
230 PO(I)=EXP(LOG(10)*(AP(1,C(I))-AP(2,C(I))/(T+AP(3,C(I)))))   .
240 PRINT ,PO(I);;: NEXT I: PRINT
250 PRINT "MOLE %(100 to quit):";;: INPUT "VOC";X1:  X(1)=X1/100
260 FOR I=1 TO 2: PRINT ,N$(C(I));"(";I;")";;: NEXT I: PRINT
270 X(2)=(100-X1)/100: FOR K=1 TO 2: LS=0: SI=0
280 SM=0: FOR I=1 TO 2: M(I)=X(I)*MW(C(I)): SM=SM+M(I): DS=0
290 FOR J=1 TO 2: DS=DS+X(J)*W(C(I),C(J)): NEXT J
300 SI=SI+X(I)*W(C(I),C(K))/DS: NEXT I
310 FOR J=1 TO 2: LS=LS+X(J)*W(C(K),C(J)): NEXT J
320 G(K)=EXP(1-LOG(LS)-SI): 'PRINT "g=";G(K);" ";
330 P(K)=G(K)*PO(K)*X(K): NEXT K
340 PRINT "       ";;: FOR I=1 TO 2: PRINT USING "##.#";100*X(I);;: PRINT "%=";
350 PRINT USING "####.#";INT(10*P(I)+.5)/10;;: PRINT " TORR ";
```

```
360 NEXT I: PRINT "@";T;" C":: PRINT "     ";
370 FOR I=1 TO 2: PRINT "    =";: PRINT USING "##.##";100*M(I)/SM;
380 PRINT "wt%   ";: NEXT I: PRINT
390 IF X(1)<>1 THEN GOTO 250
```

APPENDIX F
PROGRAM BEERLAW3.BAS

SOLUTE:MeOH NO AP @ 1014.8/cm # 2/cm
A ERROR= # 1.064685E-02
P INTERCEPT(Offset) 1.409698

SLOPE= 2.712427E-02 # 1.238989E-04
INTERCEPT=-3.823704E-02 # 5.083854E-03

HIR P(i)	A(i)	Acalc(i)
5.7	.13007	.1163713
10.6	.25196	.2492802
15.4	.36869	.3794767
19.2	.47019	.4825489
26.3	.66348	.6751311
32.4	.84267	.8405892
37.9	.98846	.9897728
5.7	.13016	.1163713
10.6	.25031	.2492802
15.4	.36407	.3794767
19.2	.473	.4825489
26.3	.66797	.6751311
32.4	.84941	.8405892
37.9	.9949	.9897728
5.7	.13024	.1163713
10.6	.25458	.2492802
15.4	.3713	.3794767
19.2	.46865	.4825489
26.3	.67188	.6751311
32.4	.85172	.8405892
37.9	1.0058	.9897728

```basic
100 'BEERLAW3 DEC Best, HIR Best or GOA Publ. W(ij)s 10-26-95
110 SCREEN 9: KEY OFF: CLS: LOCATE 1,1: DIM X(3,7),Y(3,7),YC(3,7)
112 INPUT "DEC Best, GOA Pulb., or HIR Best W(ij)s? (D/G/H)",B$
120 FOR S=1 TO 8: READ L: READ N: C=N: TN=N: N=N/3
125 FOR K=1 TO N: READ P(K): NEXT K
127 FOR K=1 TO N: READ Q(K): NEXT K
130 FOR K=1 TO L: FOR I=1 TO 3: FOR J=1 TO N: READ X(I,J),Y(I,J)
135 IF B$="D" THEN X(I,J)=P(J)
137 IF B$="G" THEN X(I,J)=Q(J)
139 NEXT J: NEXT I: READ C$,W$
140 XY=0: X2=0: Y2=0: XS=0: YS=0: NM=0: NB=0: D=0: SL=0: IN=0: SR=0
150 FOR I=1 TO 3: FOR J=1 TO N
160 XS=XS+X(I,J): YS=YS+Y(I,J): Y2=Y2+Y(I,J)*Y(I,J)
170 XY=XY+X(I,J)*Y(I,J): X2=X2+X(I,J)*X(I,J): NEXT J: NEXT I
180 NM=(C*XY)-(XS*YS): NB=(X2*YS)-(XY*XS): D=(C*X2)-(XS*XS)
190 SL=NM/D: IN=NB/D
200 TS=Y2-(YS*YS/C): RS=SL*NM/C: SS=TS-RS
210 SQ=SS/(C-2): SY=SQR(SQ)
220 EM=SY*SQR(N/D): EB=SY*SQR(X2/D): EY=SY: '/SQR(N)
230 CLS: PRINT "SOLUTE:";C$;" @ ";W$;TAB(40);
240 PRINT "SLOPE=";SL;"#";EM
250 PRINT "A ERROR= #";EY;TAB(40);"INTERCEPT=";IN;"#";EB
260 FOR I=1 TO 3: FOR J=1 TO N
265 YC(I,J)=IN+SL*X(I,J): SR=SR+(Y(I,J)-YC(I,J))^2: NEXT J: NEXT I
270 PRINT "P INTERCEPT(Offset)";-IN/SL;TAB(40);
272 IF B$="D" THEN PRINT "DEC";
274 IF B$="G" THEN PRINT "GOA";
276 IF B$<>"D" AND B$<>"G" THEN PRINT "HIR";
280 PRINT "  P(i)    A(i)    Acalc(i)"
290 FOR I=1 TO 3: FOR J=1 TO N
295 PRINT TAB(40);X(I,J);TAB(50);Y(I,J);TAB(60);YC(I,J);: NEXT J: NEXT I
300 IF 3*N<TN THEN PRINT TAB(40);"REJECTED";TN-C;"OF";TN;"POINTS!"
310 PSET (0,0): LINE -(0,349): LINE -(639,349)
320 FOR I=1 TO 3: FOR J=1 TO N: CIRCLE(5*X(I,J),349-75*Y(I,J)),3: NEXT J: NEXT I
340 FOR X=0 TO 128: PSET (5*X,349-75*(SL*X+IN)): NEXT X
350 WHILE INKEY$="": WEND: 'IF EY>.019 AND N>4 THEN GOTO 420
360 NEXT K: N=TN/3: NEXT S: END
370 SP=1: FOR I=2 TO N: IF ABS(Y(I)-YC(I))>ABS(Y(SP)-YC(SP)) THEN SP=I
380 NEXT I: X(SP)=X(N): Y(SP)=Y(N): N=N-1: GOTO 140
381 'MeOH/H2O: vapr vs INTEGRATED absorb (FTIR) 11/14/94 NO APOD
382 DATA 1,21,5.7,10.7,15.6,19.5,26.7,33.0,38.5,6.7,12.3,17.6,21.7,29.2,35.4,40.8
383 DATA 5.7,.102299,10.6,.204151,15.4,.299779,19.2,.381968
384 DATA 26.3,.536905,32.4,.679620,37.9,.7928130
385 DATA 5.7,.102119,10.6,.202922,15.4,.297331,19.2,.384899
386 DATA 26.3,.540308,32.4,.687699,37.9,.800680
387 DATA 5.7,.102494,10.6,.210693,15.4,.301829,19.2,.382241
388 DATA 26.3,.542445,32.4,.689165,37.9,.815468,"MeOH/100","961-1115/cm # 2/cm"
400 FOR I=2*N/3 TO N-1: X(I,J)=X(I+1,J): Y(I,J)=Y(I+1,J): NEXT I
410 FOR I=N/3 TO N-2: X(I)=X(I+1): Y(I)=Y(I+1): NEXT I
420 C=C-3: N=N-1: GOTO 140
1000 'MeOH/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1002 DATA 3,21,5.7,10.7,15.6,19.5,26.7,33.0,38.5,6.7,12.3,17.6,21.7,29.2,35.4,40.8
1004 DATA 5.7,.13007,10.6,.25196,15.4,.36869,19.2,.47019
1006 DATA 26.3,.66348,32.4,.84267,37.9,.98846
1008 DATA 5.7,.13016,10.6,.25031,15.4,.36407,19.2,.473
1010 DATA 26.3,.66797,32.4,.84941,37.9,.9949
```

1012 DATA 5.7,.13024,10.6,.25458,15.4,.3713,19.2,.46865
1014 DATA 26.3,.67188,32.4,.85172,37.9,1.0058,"MeOH NO AP","1014.8/cm # 2/cm"
1016 DATA 5.7,.37784,10.6,.68145,15.4,.87175,19.2,1.0608
1018 DATA 26.3,1.2217,32.4,1.5834,37.9,1.6729
1020 DATA 5.7,.37884,10.6,.68056,15.4,.93202,19.2,1.0604
1022 DATA 26.3,1.2201,32.4,1.6971,37.9,1.8859
1024 DATA 5.7,.37986,10.6,.68566,15.4,.92313,19.2,1.1125
1026 DATA 26.3,1.20578,32.4,1.6326,37.9,1.958,"MeOH NO AP","1034.1/cm # 2/cm"
1028 DATA 5.7,.17841,10.6,.34836,15.4,.50969,19.2,.65033
1030 DATA 26.3,.92672,32.4,1.1652,37.9,1.3601
1032 DATA 5.7,.17793,10.6,.34538,15.4,.50475,19.2,.65794
1034 DATA 26.3,.93155,32.4,1.1767,37.9,1.3683
1036 DATA 5.7,.17863,10.6,.35383,15.4,.51352,19.2,.64708
1038 DATA 26.3,.92978,32.4,1.1808,37.9,1.3803,"MeOH NO AP","1057.3/cm # 2/cm"
1100 'EtOH/H2O: VAPR VS ABSORB (FTIR) 1/5/95 NO APOD
1102 DATA 5,21,5.0,10.4,15.8,23.6,28.2,32.4,35.5,5.5,10.9,15.9,22.8,27.3,31.8,35.0
1104 DATA 4.7,.025933,9.7,.055651,14.7,.098817,22.3,.15593
1106 DATA 27.1,.17783,31.6,.1962,34.8,.22167
1108 DATA 4.7,.025565,9.7,.055855,14.7,.098673,22.3,.15558
1110 DATA 27.1,.18086,31.6,.20141,34.8,.22505
1112 DATA 4.7,.025749,9.7,.056921,14.7,.099193,22.3,.15744
1114 DATA 27.1,.18155,31.6,.20365,34.8,.22236,"EtOH NO AP","879.81/cm # 2/cm"
1116 DATA 4.7,.075311,9.7,.16235,14.7,.28405,22.3,.44388
1118 DATA 27.1,.50408,31.6,.56216,34.8,.63098
1120 DATA 4.7,.07519,9.7,.16277,14.7,.28293,22.3,.44385
1122 DATA 27.1,.51033,31.6,.56909,34.8,.63205
1124 DATA 4.7,.075247,9.7,.16612,14.7,.28327,22.3,.44579
1126 DATA 27.1,.51423,31.6,.57561,34.8,.63226,"EtOH NO AP","1028.3/cm # 2/cm"
1128 DATA 4.7,.1329,9.7,.2752,14.7,.48142,22.3,.74245
1130 DATA 27.1,.85399,31.6,.94287,34.8,1.0616
1132 DATA 4.7,.1332,9.7,.27779,14.7,.48409,22.3,.75211
1134 DATA 27.1,.86563,31.6,.95706,34.8,1.0715
1136 DATA 4.7,.13356,9.7,.28282,14.7,.4855,22.3,.76041
1138 DATA 27.1,.87645,31.6,.96691,34.8,1.0714,"EtOH NO AP","1057.3/cm # 2/cm"
1140 DATA 4.7,.14074,9.7,.30047,14.7,.52862,22.3,.82426
1142 DATA 27.1,.93854,31.6,1.048,34.8,1.1788
1144 DATA 4.7,.14055,9.7,.3027,14.7,.53115,22.3,.82633
1146 DATA 27.1,.95202,31.6,1.0602,34.8,1.1877
1148 DATA 4.7,.1408,9.7,.30892,14.7,.53011,22.3,.83817
1150 DATA 27.1,.95996,31.6,1.0709,34.8,1.1848,"EtOH NO AP","1066.9/cm # 2/cm"
1152 DATA 4.7,.032808,9.7,.070199,14.7,.12428,22.3,.19382
1154 DATA 27.1,.21778,31.6,.24537,34.8,.27643
1156 DATA 4.7,.032138,9.7,.069559,14.7,.12304,22.3,.18962
1158 DATA 27.1,.22071,31.6,.24849,34.8,.2785
1160 DATA 4.7,.031856,9.7,.071425,14.7,.12149,22.3,.19189
1162 DATA 27.1,.22206,31.6,.25081,34.8,.27523,"EtOH NO AP","1242.5/cm # 2/cm"
1200 'iPrOH/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1202 DATA 6,21,7.4,14.0,21.1,25.0,27.8,31.4,36.1,7.5,15.1,23.1,26.2,28.5,31.6,36.1
1204 DATA 5.1,.019213,9.8,.03729,15.1,.059455,17.8,.063278
1206 DATA 19.9,.07857,22.4,.082773,25.9,.097396
1208 DATA 5.1,0.01525,9.8,0.035126,15.1,.059711,17.8,.067951
1210 DATA 19.9,.074782,22.4,.083546,25.9,.098265
1212 DATA 5.1,0.0196,9.8,.037577,15.1,.060081,17.8,.063976,19.9,.079168
1214 DATA 22.4,.079466,25.9,.098673,"iPrOH NO AP","827.72/cm # 2/cm"
1216 DATA 5.1,.10389,9.8,.2682,15.1,.42473,17.8,.47903
1218 DATA 19.9,.55877,22.4,.58515,25.9,.68096

1220 DATA 5.1,.10389,9.8,.26817,15.1,.42795,17.8,.48632,19.9,.55744
1222 DATA 22.4,.59033,25.9,.6855
1224 DATA 5.1,.10465,9.8,.27089,15.1,.42958,17.8,.48318,19.9,.56424
1226 DATA 22.4,.59063,25.9,.6892,"iPrOH NO AP","956.99/cm # 2/cm"
1228 DATA 5.1,.087543,9.8,.22664,15.1,.35739,17.8,.40279,19.9,.47011
1230 DATA 22.4,.49209,25.9,.57466
1232 DATA 5.1,0.083698,9.8,.22594,15.1,.3611,17.8,.40932,19.9,.46793
1234 DATA 22.4,.49679,25.9,.57883
1236 DATA 5.1,.088345,9.8,.22842,15.1,.36243,17.8,.40638,19.9,.47341
1238 DATA 22.4,.49559,25.9,.58241,"iPrOH NO AP","964.71/cm # 2/cm"
1240 DATA 5.1,.098989,9.8,.21817,15.1,.33377,17.8,.37297,19.9,.43341
1242 DATA 22.4,.45224,25.9,.5305
1244 DATA 5.1,.094756,9.8,.21795,15.1,.33688,17.8,.37911,19.9,.43095
1246 DATA 22.4,.45577,25.9,.52369
1248 DATA 5.1,.098749,9.8,.21954,15.1,.33809,17.8,.37651,19.9,.43692
1250 DATA 22.4,.45493,25.9,.52752,"iPrOH NO AP","1072.76/cm # 2/cm"
1252 DATA 5.1,.10641,9.8,.27405,15.1,.43093,17.8,.48657,19.9,.56821
1254 DATA 22.4,.59427,25.9,.69114
1256 DATA 5.1,.10256,9.8,.27485,15.1,.43551,17.8,.49335,19.9,.56691
1258 DATA 22.4,.59931,25.9,.6959
1260 DATA 5.1,.1072,9.8,.27625,15.1,.43704,17.8,.49147,19.9,.57346
1262 DATA 22.4,.59982,25.9,.69947,"iPrOH NO AP","1151.86/cm # 2/cm"
1264 DATA 5.1,.079539,9.8,.19045,15.1,.29681,17.8,.33263,19.9,.38963
1266 DATA 22.4,.40752,25.9,.47166
1268 DATA 5.1,.075676,9.8,.19121,15.1,.29958,17.8,.33883,19.9,.38749
1270 DATA 22.4,.41102,25.9,.47502
1272 DATA 5.1,.079816,9.8,.19198,15.1,.30046,17.8,.33591,19.9,.3935
1274 DATA 22.4,.40959,25.9,.47706,"iPrOH NO AP","1252.19/cm # 2/cm"
1300 'Acetone/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1302 DATA 4,21,5.8,10.3,19.5,26.8,48.0,76.0,112.7,7.2,12.8,23.8,32.4,56.8,87.0,122.9
1304 DATA 5.2,.009225,9.3,.021227,17.5,.03759,24.1,.052586
1306 DATA 43.3,.096729,69,.15053,103.7,.23703
1308 DATA 5.2,.009274,9.3,.021319,17.5,.037714,24.1,.052566
1310 DATA 43.3,.096973,69,.16232,103.7,.23889
1312 DATA 5.2,.009274,9.3,.021272,17.5,.033679,24.1,.052653
1314 DATA 43.3,0.097371,69,.16299,103.7,.23743,"ACE NO AP","899.1/cm # 2/cm"
1316 DATA 5.2,0.016834,9.3,.02643,17.5,.0432,24.1,.058479
1318 DATA 43.3,.10638,69,.16626,103.7,.25888
1320 DATA 5.2,.016707,9.3,.026403,17.5,.043169,24.1,.058232
1322 DATA 43.3,.10674,69,.17714,103.7,.2597
1324 DATA 5.2,.016544,9.3,.026234,17.5,.03908,24.1,.058524
1326 DATA 43.3,.10745,69,.17779,103.7,.259,"ACE NO AP","1092.05/cm # 2/cm"
1328 DATA 5.2,.18846,9.3,.33285,17.5,.62145,24.1,.8599
1330 DATA 43.3,1.5356,69,1.9895,103.7,2.405
1332 DATA 5.2,.1892,9.3,.33401,17.5,.62274,24.1,.86281
1334 DATA 43.3,1.5362,69,2.211,103.7,2.4398
1336 DATA 5.2,.18959,9.3,.33334,17.5,.62109,24.1,.86499
1338 DATA 43.3,1.5368,69,2.1954,103.7,2.4149,"ACE NO AP","1217.46/cm # 2/cm"
1340 DATA 5.2,.18643,9.3,.31998,17.5,.58434,24.1,.79864
1342 DATA 43.3,1.3361,69,1.7726,103.7,1.934
1344 DATA 5.2,.18625,9.3,.32027,17.5,.58354,24.1,.79475
1346 DATA 43.3,1.3381,69,1.8002,103.7,1.9167
1348 DATA 5.2,.18717,9.3,.32106,17.5,.58271,24.1,.79691
1350 DATA 43.3,1.3352,69,1.8017,103.7,1.9099,"ACE NO AP","1366.03/cm # 2/cm"
1352 'Acetone/H2O: 2 highest vp's excluded vapr vs absorb (FTIR) 1/5/95 NO APOD
1354 DATA 2,15,5.8,10.3,19.5,26.8,48.0,7.2,12.8,23.8,32.4,56.8

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1356 DATA 5.2,.18846,9.3,.33285,17.5,.62145,24.1,.8599
1358 DATA 43.3,1.5356: ',69,1.9895,103.7,2.405
1360 DATA 5.2,.1892,9.3,.33401,17.5,.62274,24.1,.86281
1362 DATA 43.3,1.5362: ',69,2.211,103.7,2.4398
1364 DATA 5.2,.18959,9.3,.33334,17.5,.62109,24.1,.86499
1366 DATA 43.3,1.5368: ',69,2.1954,103.7,2.4149,"ACE NO AP","1217.46/cm # 2/cm"
1368 DATA "ACE NOAP-5p","1217.46/cm # 2/cm"
1370 DATA 5.2,.18643,9.3,.31998,17.5,.58434,24.1,.79864
1372 DATA 43.3,1.3361: ',69,1.7726,103.7,1.934
1374 DATA 5.2,.18625,9.3,.32027,17.5,.58354,24.1,.79475
1376 DATA 43.3,1.3381: ',69,1.8002,103.7,1.9167
1378 DATA 5.2,.18717,9.3,.32106,17.5,.58271,24.1,.79691
1380 DATA 43.3,1.3352: ',69,1.8017,103.7,1.9099,"ACE NO AP","1366.03/cm # 2/cm"
1382 DATA "ACE NOAP-5p","1366.03/cm # 2/cm"
1400 'MEK/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1402 DATA 5,12,17.5,28.8,41.4,51.6,14.9,25.5,38.6,50.7
1404 DATA 27.7,.021953,40.1,.026048,50.2,.035031,56,.038591
1406 DATA 27.7,.022564,40.1,0.02668,50.2,.03519,56,.042549
1408 DATA 27.7,.022866,40.1,.027025,50.2,.03937,56,.043253
1410 DATA "MEK NO AP","760.2/cm # 2/cm"
1412 DATA 27.7,.051128,40.1,.076647,50.2,.10449,56,.11856
1414 DATA 27.7,.052517,40.1,.077864,50.2,.10541,56,.12226
1416 DATA 27.7,.053401,40.1,.078796,50.2,.1124,56,.1235
1418 DATA "MEK NO AP","941.56/cm # 2/cm"
1420 DATA 27.7,.024595,40.1,.026079,50.2,.032635,56,.044765
1422 DATA 27.7,.023374,40.1,.026339,50.2,.032909,56,.043943
1424 DATA 27.7,.023725,40.1,.026688,50.2,.041028,56,.044463
1426 DATA "MEK NO AP","1080.4/cm # 2/cm"
1428 DATA 27.7,.2397,40.1,.39425,50.2,.53737,56,.60891
1430 DATA 27.7,.24602,40.1,.39946,50.2,.54262,56,.61028
1432 DATA 27.7,.2494,40.1,.4036,50.2,.55435,56,.61532
1434 DATA "MEK NO AP","1175.02/cm # 2/cm"
1436 DATA 27.7,.24294,40.1,.37646,50.2,.50644,56,.57525
1438 DATA 27.7,.23362,40.1,.38076,50.2,.5111,56,.57741
1440 DATA 27.7,.23942,40.1,.3847,50.2,.52968,56,.58261
1442 DATA "MEK NO AP","1366.03/cm # 2/cm"
1452 DATA 3,9,17.5,28.8,41.4,14.9,25.5,38.6: '51.6...,50.7
1454 'DATA 27.7,.021953,40.1,.026048,50.2,.035031: ',56,.038591
1456 'DATA 27.7,.022564,40.1,0.02668,50.2,.03519: ',56,.042549
1458 'DATA 27.7,.022866,40.1,.027025,50.2,.03937: ',56,.043253
1460 'DATA "MEK NO AP","760.2/cm # 2/cm"
1462 DATA 27.7,.051128,40.1,.076647,50.2,.10449: ',56,.11856
1464 DATA 27.7,.052517,40.1,.077864,50.2,.10541: ',56,.12226
1466 DATA 27.7,.053401,40.1,.078796,50.2,.1124: ',56,.1235
1468 DATA "MEK NO AP","941.56/cm # 2/cm"
1470 'DATA 27.7,.024595,40.1,.026079,50.2,.032635,56,.044765
1472 'DATA 27.7,.023374,40.1,.026339,50.2,.032909,56,.043943
1474 'DATA 27.7,.023725,40.1,.026688,50.2,.041028,56,.044463
1476 'DATA "MEK NO AP","1080.4/cm # 2/cm"
1478 DATA 27.7,.2397,40.1,.39425,50.2,.53737: ',56,.60891
1480 DATA 27.7,.24602,40.1,.39946,50.2,.54262: ',56,.61028
1482 DATA 27.7,.2494,40.1,.4036,50.2,.55435: ',56,.61532
1484 DATA "MEK NO AP","1175.02/cm # 2/cm"
1486 DATA 27.7,.24294,40.1,.37646,50.2,.50644: ',56,.57525
1488 DATA 27.7,.23362,40.1,.38076,50.2,.5111: ',56,.57741
1490 DATA 27.7,.23942,40.1,.3847,50.2,.52968: ',56,.58261
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1492 DATA "MEK NO AP","1366.03/cm # 2/cm"
1500 '
1510 'MeOH/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1520 'DATA 3,21,12,3,12,9,12,11,13,41,13,46,13,50,14,21,14,24,14,29,14,59,15,2,15,5,15,36,
        15,39,15,41,16,10,16,16,16,19,16,51,16,54,16,57: '1/6/94 Sample times H,M
1530 'EtOH/H2O: VAPR VS ABSORB (FTIR) 1/5/95 NO APOD
1540 'DATA 5,21,19,54,19,55,19,57,20,17,20,20,20,23,20,47,20,48,20,49,21,15,21,17,21,19,21,
        41,21,42,21,44,22,8,22,10,22,12,22,39,22,40,22,42: '1/6/94 Sample times H,M
1550 'iPrOH/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1560 'DATA 6,21,11,25,11,26,11,27,11,51,11,53,11,53,12,14,12,15,12,16,12,34,12,35,12,36,13,
        35,13,36,13,37,13,58,13,59,13,60,14,28,14,29,14,30
1570 'Acetone/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1580 'DATA 4,21,9,25,9,26,9,27,9,49,9,50,9,50,10,17,10,18,10,19,10,46,10,47,10,48,11,18,11,
        19,11,20,11,49,11,50,11,51,12,13,12,15,12,16: 'Sample times 1/8/94 H,M
1590 'Acetone/H2O: 2 highest vp's excluded vapr vs absorb (FTIR) 1/5/95 NO APOD
1600 'DATA 2,15,9,25,9,26,9,27,9,49,9,50,9,50,10,17,10,18,10,19,10,46,10,47,10,48,11,18,11,
        19,11,20,11,49,11,50,11,51,12,13,12,15,12,16: 'Sample times 1/8/94 H,M
1610 'MEK/H2O: vapr vs absorb (FTIR) 1/5/95 NO APOD
1620 'DATA 5,12,11,28,11,29,11,31,13,17,13,18,13,18,13,50,13,50,13,51,14,13,14,14,14,15:
        'Sample times 11/10/94 H,M
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